

## **The Venetian tornesello : a medieval colonial coinage / by Alan M. Stahl.**

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**THE VENETIAN TORNESELLO  
A MEDIEVAL COLONIAL COINAGE**

BY ALAN M. STAHL



**THE AMERICAN NUMISMATIC SOCIETY**

**NEW YORK**

**1985**











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THE AMERICAN NUMISMATIC SOCIETY  
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## PREFACE

The impetus for this study came from the loan of the Chalkis Hoard to the American Numismatic Society by John Aiello, an American coin dealer. I record here my thanks to Mr. Aiello for this loan of the hoard and for arranging the gift of important and representative coins from this hoard, as well as two subsequent parcels of torneselli, to the ANS. The archival research for this study was made possible by a grant from the Gladys K. Delmas Foundation, which also provided financial support for this publication. The Delmas Foundation has continued its generosity with the award of a further grant to allow me to pursue an investigation of the operation of the mint of Venice in the medieval period. I would like to express my gratitude also to the many scholars who have offered information and advice on this topic, especially to Professors Frederic C. Lane and Reinhold C. Mueller, who have shared with me their expertise on matters relating to Venetian monetary history and have allowed me to consult manuscript drafts of the relevant sections of their forthcoming joint work on the subject. I am also grateful to Dr. Maria Francesco Tiepolo and Dr. Giorgetta Bonfiglio Dosio of the Archivio di Stato, Venice, for their assistance and advice.

As in all studies of this nature, the accumulation of numismatic evidence for the tornesello is the result of the cooperation and assistance of numerous curators, excavators and collectors, to all of whom I am most grateful. I should like to single out for special thanks Professor Giovanni Gorini and Dr. Andrea Saccocci of the Museo Bottacin in Padua, Dr. Lucia Bellodi Casanova of the Museo Correr in Venice, Dr. D. M. Metcalf of the Ashmolean Museum in Oxford, Dr. Mando Oeconomides and Mr. Yannis Touratsoglou of the National Numismatic Museum of Athens, Dr. Alan S. Walker of the Athens Agora Excavations, Dr. Orestes H. Zervos of the Corinth Excavations, Mr. Philip D. Greenall of



London, and Mr. Anastasios P. Tzamalis of Athens. I express my great thanks to Professor Peter P. Gaspar of Washington University, St. Louis, who devised and supervised the chemical analysis which permitted much of the economic inference about the tornesello. Finally, I wish to express my gratitude to the Council and staff of the American Numismatic Society, who have given me consistent encouragement and support throughout this project.

## VENETIAN COINAGE IN MEDIEVAL GREECE

When the Latin participants in the Fourth Crusade divided up the Greek mainland and islands after their capture of Constantinople in 1204, they found there a coinage system containing Byzantine denominations in gold, silver and bronze. This they replaced with a circulation based upon the silver penny, familiar to Latin Europe for centuries.<sup>1</sup>

At first coins were brought from the homelands of the settlers, chiefly base silver deniers tournois to the Frankish mainland principalities and Venetian silver piccoli and grossi to the new island colonies. In the course of the thirteenth century, the main feudal rulers of the Greek mainland established mints which produced deniers tournois on the French model, but bearing the names of the local issuers and mints. They persisted in minting only this petty currency even after France and other European states had adopted the practice of issuing larger multiple coins of fine silver and of gold. The petty coinage may have been adequate for most uses, but large transactions were facilitated by imported coins of higher value. The Byzantine gold hyperperon, minted now by the exiled emperors in Nicaea, circulated widely in the Balkans and served as the basis for the accounting systems of all of Latin Greece. The penny of England had long held a value much above those of France, and the thirteenth century saw the English sterling circulate in Greece as the equivalent of four deniers tournois.

In 1284 Venice began minting a gold coin, the ducat, following the initiatives of Florence and Genoa 32 years earlier.<sup>2</sup> The ducat soon became the basic money of the long distance trade of Venice and appears in documents of its colonies and of the Greek mainland for the rest of the Middle Ages. It is, however, difficult to distinguish the appearance in records of the ducat as an actual coin from its use as a measure of value,

<sup>1</sup> D. M. Metcalf, *Coinage in South-Eastern Europe, 820-1396*, Royal Numismatic Society Special Publications 11 (London, 1979), pp. 234-67.

<sup>2</sup> N. Papadopoli, *Le Monete di Venezia* (Venice, 1893-1919), 1, pp. 123-26.

and even more difficult to gauge the importance of its circulation in Greece relative to other coins. Only one hoard of ducats is known to have been found in Greece, and another hoard, basically of silver coins, contained two ducats.<sup>3</sup> No ducats have been found in Greek excavations, but gold coins are rarely found as stray losses in habitation sites.

From documents it appears that ducats were in good supply in Candia, the capital and main port of the Venetian colony of Crete; there the problem appears to have been the detection of counterfeit ducats apparently minted by the Turks.<sup>4</sup> Even in Candia, however, the use of the ducat may have been reserved for long distance trade. In 1403, an inquisition was held over the payments for a parcel of land in the area: examination of the actual bags used in payment revealed that only one-seventh of the price was paid using 33 gold ducats; the balance was made up with tens of thousands of base Venetian coins.<sup>5</sup> The belongings of a Jew of the town inventoried after his death in 1408 consisted of two letters of credit, 64,000 base coins and valuable silver objects; there were no gold ducats.<sup>6</sup>

Outside the capital of Candia, ducats appear to have been even rarer. In 1410 the administrator of Rhethymno, a provincial Cretan center, asked the duke of Crete in Candia to inform him of the value of the ducat in local coinage so that he could make an exchange.<sup>7</sup> Thirty years later, the rector of Canea (another provincial center) explained to the duke that the 113 ducats which made up one-sixth of the revenue he was sending to the capital were collected at a local rate, as ducats were very scarce in his town.<sup>8</sup>

<sup>3</sup> Metcalf (above, n. 1), p. 299.

<sup>4</sup> E. g. Archivio del Duca di Candia (henceforth ADC), in the Archivio di Stato, Venice (henceforth ASV), Proclami, B. 14bis, f. 71v-72r, 73 (4 Apr. 1361); f. 176v, 100 (13 Dec. 1369); and f. 184, 128 (23 June 1370).

<sup>5</sup> ADC, Memoriali, B. 30bis, q. 26, fasc. 5, f. 18-20v (23 May 1403).

<sup>6</sup> ADC, Atti Antichi, B. 11, q. 15, f. 9 (11 May 1408).

<sup>7</sup> ADC, Ducali, B. 1, q. 6, f. 12v (10 Dec. 1410).

<sup>8</sup> ADC, Ducali, B. 2, q. 18, f. 23v (11 Feb. 144[2]); publ. in F. Thiriet, ed., *Délibérations des assemblées vénitiennes concernant la Romanie*, École Pratique des Hautes Études, VI<sup>e</sup> Section, Documents et recherches 8, 11 (Paris, 1966-71), 2, pp. 320-21, 1382. All dates in January and February, which according to the *more veneto* were considered as belonging to the preceding year, are here corrected to modern reckoning and so indicated by brackets.

Beyond the Venetian colonies, on the Greek mainland, ducats may have been even scarcer. In 1361 the agent of Marie de Bourbon collecting her revenues in the Peloponnesus complained of repeated difficulties changing the silver he received into ducats. In Vostitza and Nauplia he was able to change only half of the silver into ducats, while at Clarentza he was forced to leave all his silver with a money changer until the arrival of a boat from Venice which might carry ducats.<sup>9</sup>

It is no longer thought that the Venetian grosso was introduced in 1202 in conjunction with the Fourth Crusade; its minting appears to have begun late in the twelfth century.<sup>10</sup> However, it is clear that this large silver coin, Europe's first true multiple denomination, circulated widely in the Balkans after the conquest of Byzantium. While the grosso formed the basis for new coinage systems in Serbia and Bulgaria, in Greece it circulated along with the locally minted deniers tournois. In the merchant's manual of Pegolotti of the early fourteenth century, the Venetian grosso is listed as figuring in the system of the Peloponnesus as the equivalent of three sterlings of four deniers tournois each; seven grossi were said to equal the hyperperon.<sup>11</sup> Unlike the sterling and the hyperperon, which were only accounting units by this time, the grosso is specified in the manual as the actual silver coin minted in Venice; likewise the denier tournois is described as an actual coin of about 20 percent silver.

There is little numismatic evidence for the introduction of Venetian grossi into Greece in the decades immediately following the Fourth Crusade; the earliest significant survivals are from the 1230s and 1240s.<sup>12</sup> Grossi appear fairly consistently in hoards and excavations until the end of the thirteenth century. After 1300, grossi are rare in finds on the

<sup>9</sup> J. Longnon and P. Topping, eds., *Documents sur le régime des terres dans la principauté de Morée au XIV<sup>e</sup> siècle*, École Pratique des Hautes Études, VI<sup>e</sup> Section, Documents et recherches 9 (Paris, 1969), pp. 141–55, 8.

<sup>10</sup> L. B. Robbert, "Reorganization of the Venetian Coinage by Doge Enrico Dandolo," *Speculum* 49 (1974), pp. 48–60; D. E. Queller, "A Note on the Reorganization of the Venetian Coinage by Doge Enrico Dandolo," *RIN* 77 (1975), pp. 167–72.

<sup>11</sup> Francesco Balducci Pegolotti, in A. Evans, ed., *La Pratica della Mercatura*, Mediaeval Academy of America, Publications 24 (Cambridge, Mass., 1936), pp. 116–18.

<sup>12</sup> See Metcalf (above, n. 1), p. 221, for a survey of Balkan hoards containing grossi.

Greek mainland and, after the introduction of the soldino in 1332, virtually non-existent, though they were minted intermittently for use in Venice and for export elsewhere through the fifteenth century. Too few hoards and excavations have been reported from the Venetian colonies to be able to trace the use of grossi there.

By the end of the thirteenth century, mints in Thebes and Clarentza were producing large quantities of deniers tournois for the dukes of Athens and princes of Achaia respectively. A handful of other mints in Greece also issued significant quantities of deniers around the year 1300. In 1305 the government of Venice, noting the loss of income to its own treasury and to Venetian merchants from this minting, authorized the establishment in its mainland outposts of Coron and Modon of a mint to produce coins in competition. There is no evidence, numismatic or documentary, that such plans were ever carried out.<sup>13</sup>

The striking of deniers tournois in the duchy of Athens apparently ended before the beginning of Catalan domination in 1311. By 1330, activity had been curtailed at the Achaian mint of Clarentza as well as at the smaller mainland mints. The older deniers tournois continued to circulate, however, long after their minting. In a hoard deposited in the early fifteenth century, almost one-third of the coins were deniers tournois minted before 1310, about a century earlier.<sup>14</sup>

In 1332 Venice created a small silver coin, the soldino, worth 12 Venetian piccoli.<sup>15</sup> The circumstances and purposes for the introduction of the soldino are obscure, but almost immediately it seems to have replaced the grosso in circulation in Greece. Few grossi after that date appear in hoards or excavations from Greece. Four hoards deposited on the Greek mainland between 1340 and 1380 consist almost entirely of Venetian soldini and earlier Frankish deniers tournois, ap-

<sup>13</sup> ASV, Maggior Consiglio, Magnus, f. 78v (7 Mar. 1305); publ. in V. Lazari, *Le monete dei possedimenti veneziani* (Venice, 1851), p. 98. In 1322, however, two men were arrested for manufacturing within Venice "denarios parvos falsos ad stampam de la torre," presumably deniers tournois, with dies stolen from the mint. It is not clear from the source whether the dies were engraved with the tower before or after their removal from the mint: ASV, Signori di Notte al Criminal, R. 16, f. 69v (2 Dec. 1322).

<sup>14</sup> Delphi Sector A Hoard, see Appendix 2, 6, below.

<sup>15</sup> Papadopoli (above, n. 2), 1, pp. 158–61.

parently reflecting the circulation of this period.<sup>16</sup> On Crete, documents of the 1340s refer to payments as made specifically in soldini, though the grosso, like the hyperperon, was maintained as a unit of account after it had ceased to circulate as a coin.<sup>17</sup>

The soldino was worth 12 Venetian piccoli and was so accounted in the Venetian colonies. As the denier tournois had been worth about three piccoli, the soldino was valued at four tournois. It thus replaced the English sterling, which had ceased to circulate in Greece, as a multiple coin worth four deniers tournois, though on the mainland as in the Venetian colonies accounts continued to be reckoned in terms of the grosso and the hyperperon.

On 29 Mar. 1353, two proposals were made before the Quarantia of Venice for a new soldino, specifically acknowledging the needs of merchants and others in "Romania," i.e. the parts of the eastern Mediterranean held by Latins since the Fourth Crusade.<sup>18</sup> The first proposal was for the soldino to be minted at the weight of 36 soldi to the mark (that is 36 times 12 to the Venetian mark of 238.5 g) of the same silver as the mezzanino (which was presumably of the Venetian *argento de bulla* of .965 fineness).<sup>19</sup> This would result in a coin weighing about .55 g, with .53 g of silver. The alternative proposal for the new soldino was for a coin of higher weight (22 soldi to the mark) but of five parts *argento de bulla* and three parts copper, resulting in a coin weighing about .90 g

<sup>16</sup> Delphi gamma, Patras, Kapareli and Eleusis, for contents see D. M. Metcalf, "The Currency of *Deniers Tournois* in Frankish Greece," *Annual of the British School of Archaeology at Athens* 55 (1960), p. 57.

<sup>17</sup> ADC, Memoriali, B. 29, q. 6, f. 7v (23 Aug. 1341): "yppa. LXXXV in soldinis"; ADC, Proclami, B. 14, f. 185, 1 (15 May 1345): "yppa. XX que ferebat in soldinis"; R. Morozzo della Rocca, ed., *Lettere di mercanti a Pignol Zucchello, 1336-1350*, Fonti per la Storia di Venezia, Sect. 4 (Venice, 1957), p. 45, 19 (27 Oct. 1345): "perperi XV grossi VI in saldini e non en altro peroché così gli ò riceuti."

<sup>18</sup> ASV, Quarantia Criminale, B. 16, f. 74v (29 Mar. 1353); publ. in R. Cessi, ed., *Problemi monetari veneziani (fino a tutto il secolo XIV)*, Documenti finanziari della Repubblica di Venezia, ser. 4, 1 (Padua, 1937), pp. 102-3, 115; and in A. Lombardo, ed., *Le Deliberazioni del Consiglio dei XL della Repubblica di Venezia*, Deputazione di storia patria per le Venezie, Monumenti storici, NS 20 (Venice, 1967), pp. 10-11, 31.

<sup>19</sup> A. Martini, *Manuale di Metrologia* (Turin, 1883), p. 818; Pegolotti (above, n. 11), p. 291.



with about .54 g of silver. Both coins represented a lowering in silver content from the current soldino; the first proposal would bring the soldino up to the traditional fineness of Venetian silver coins, while the second would be near the existing soldino weight of .96 g. The lighter, finer coin was chosen in the authorization passed on 8 Apr. 1353.<sup>20</sup> It cannot be determined from documents or finds whether the new soldino circulated in Greece at full value or at a discount; finds of soldini of the new type are rare in Greece.<sup>21</sup>

<sup>20</sup> ASV, Quarantia Criminale, B. 16, f. 75 (8 Apr. 1353); publ. in Cessi, *Problemi* (above, n. 18), pp. 103–4, 117; and in F. Thiriet, *Assemblées* (above, n. 8), 1, pp. 313–14, 603; and in Papadopoli (above, n. 2), 1, p. 175.

<sup>21</sup> Two finds with later soldini are from Eretria, see Appendix 2, 7, below, and Pyrgos, A. P. Tzamalīs, "Some New Evidence of the Coinage of the Gattilusii, Lords of Lesbos," *NCirc* (1980), pp. 2–4; both finds are of questionable integrity.

## THE INTRODUCTION OF THE TORNESELLO

On 29 July 1353, four months after the lowering in weight of the soldino, the Quarantia of Venice recorded the authorization of the minting of a new coin, called in this and other Latin documents a *turonensis* and in most Italian sources a *tornesello*.<sup>22</sup> These names correspond to those used for the Frankish denier *tournois*, and it is apparent that the Venetian *tornesello* was intended as a replacement for this coin, whose minting had ceased by 1350. The new coinage was specifically designated as being for the colonies of Coron and Modon, Negroponte and Crete, and was to be sent in quantities as great as possible to the administrators of these places to be used for meeting expenses.

The alloy of the *tornesello* is specified in the authorization as containing eight parts copper to one part silver (presumably *de bulla*), with a resultant silver fineness of about 11 percent. The weight is defined as 80 *manus* of coins per mark. *Manus* is not a term which commonly occurs in the numismatic terminology of Venice, or of medieval Europe as a whole. The Venetian mercantile manual known as the *Zibaldone da Canal*, compiled in the early fourteenth century, notes that in Clarenza and in Coron and throughout the Peloponnesus 20 *manus* of *tournois* are accounted as one *hyperperon*, which is equivalent to six *soldi* and eight *piccoli* of *tournois*.<sup>23</sup> Six *soldi* and eight *piccoli* of *deniers tournois* would be 80 *tournois* coins, so one *manus* must be a term for four coins. The same inference can be made from another manual of the mid-fourteenth

<sup>22</sup> Appendix 4, 1, below.

<sup>23</sup> A. Stussi, ed., *Zibaldone da Canal, Manoscritto mercantile del sec. XIV*, Fonti per la storia di Venezia, Sect. 5 (Venice, 1967), p. 58: "mane XX de tornexi se conta ippr. I ch'è s. VI dir. VIII de tornexi." The editor's gloss of 'mane' as *mine*, a common unit of weight appearing elsewhere in the work is inconsistent in this context, as the *mina* was a grain measure ranging from one-half to four bushels; see F. Edler [de Roover], *Glossary of Mediaeval Terms of Business; Italian Series, 1200-1600* (Cambridge, Mass., 1934), s.v. "Mina."

century in which "man 60 de grossi" is explained as 240 grossi.<sup>24</sup> Thus the authorization for the tornesello setting the weight at 80 manus to the mark must mean 80 times four coins, or 320 torneselli to the Venetian mark of 238.5 g.<sup>25</sup> This would result in a weight per coin of about .75 grams.

The authorization specifies that the value of the tornesello be equal to three piccoli; four torneselli would be worth one soldino. With a weight of .75 g and a silver fineness of .11, the tornesello would contain about .08 g of silver. Four torneselli would then contain .33 g of silver, while the new soldino, authorized several months earlier, would have had .53 g of silver. Such a discrepancy between the relative intrinsic values of coins within the same system can lead to problems, but it is not necessarily unworkable. Many monetary systems have had low denomination coins whose intrinsic value was significantly less than the fraction of the larger coin which they represented. The key to the success of the tornesello appears to have been the fact that it was apparently intended to circulate only in the Greek colonies rather than in Venice itself. The authorities' main problem was to induce users in the colonies to accept the overvalued tornesello.

In Greece the tornesello would have had the advantage of representing a familiar unit of coinage; even if the deniers tournois of Achaia and Athens did not circulate officially in the Venetian colonies, they would no doubt have been familiar to all merchants in the region.<sup>26</sup> While the tornesello did not have the distinctive tower reverse of the denier tournois, it was of the same general fabric and module and had the same obverse cross. With 11 percent silver it was baser than the deniers tournois of the thirteenth century, but those tournois minted in the early fourteenth century appear to have been baser still.<sup>27</sup>

Within the Venetian colonies, governmental expenditures and sanctions could impel the circulation of torneselli. The original authorization

<sup>24</sup> R. Cessi, ed., *Tarifa zoè noticia dy pexi e mexure* (Venice, 1925), pp. 12 and 68.

<sup>25</sup> Martini (above, n. 19), p. 818.

<sup>26</sup> The appearance of the term "turonas" in a Cretan document of 1351, before the issue of the Venetian tornesello, suggests that deniers tournois were current even in Crete: ADC, Proclami, B. 14, f. 242v-244v, 21 (12 Mar. 1351).

<sup>27</sup> Compare the results of neutron activation analysis on two very late deniers tournois of the Chalkis Hoard, Appendix 1, nos. 43 and 46, both with about two percent silver.

for the tornesello specified that rectors were to use the coinage in their expenditures and to make an effort to have the coin circulate in the colonies. There is no extant proclamation from the Greek colonies instituting the tornesello in 1353, but it appears that production was begun in earnest almost immediately.<sup>28</sup> A proclamation of 1362 announced the arrival in Crete of a large supply of torneselli minted in Venice and made known that the coins were to circulate as before at the rate of three piccoli per tornesello.<sup>29</sup> In 1363, Venetians in Candia rose in revolt against Venice. Though no mention of coinage is found among their grievances, they apparently minted their own torneselli and soldini during their brief time in power.<sup>30</sup> In a proclamation of 1367 the Venetian governor of Crete made known that he had learned that some merchants were refusing to accept torneselli for purchases of grain; he forbade such refusal and announced a penalty of one soldino for each tornesello refused.<sup>31</sup>

In the course of the second half of the fourteenth century, the tornesello replaced the soldino as the basic low denomination coin in the Venetian colonies of Greece. Documents of the decade before the introduction of the tornesello had specified large payments made in Crete comprising soldini.<sup>32</sup> The extremely detailed transcript of a trial held in Crete in 1368 recorded the theft from the town hall of Candia of bags of coins, within which were a large quantity of torneselli, about

<sup>28</sup> In 1354, a Venetian mint employee testified that he was working "da mattina a serra per i tornesi che in questo momento si fanno in zecca"; ASV, Maggior Consiglio, Grazie 13, f. 46v (20 June 1354), quoted in Papadopoli (above, n. 2), 1, pp. 179–80.

<sup>29</sup> Appendix 4, 2, below. This document is similar in wording and penalties to that introducing the mezzanino in 1347: ADC, Proclami, B. 14, f. 202, 88 (12 Jan. 1347); and one announcing the arrival of a shipment of piccoli in 1369: ADC, Proclami, B. 14bis, f. 178r and v, 106 (10 Sept. 1369).

<sup>30</sup> J. Jegerlehner, "Der Aufstand der kandiotischen Ritterschaft gegen das Mutterland Venedig, 1363–1365," *BZ* 12 (1903), pp. 78–125. See ADC, Proclami, B. 14bis, f. 114r and v, 26 (27 Oct. 1364), in which the governor forbids the use of "monetas soldinorum et tornesorum factas in hac terra tempore rebellionis."

<sup>31</sup> Appendix 4, 5, below.

<sup>32</sup> See above, n. 17.

half the volume of soldini, and 27 ducat coins.<sup>33</sup> In a court case of 1403, 35 years later, a dispute over the payment of a large sum for a parcel of land in Crete led to an examination of the bags of money used in the payment. To make up the total of 690 hyperpera, the purchaser had brought together 33 gold ducats, worth about 100 hyperpera, and 590 hyperpera worth of torneselli—75,520 coins; there were apparently no intermediate silver coins available for such transactions.<sup>34</sup> An inquisition post mortem of 1408 listed 500 hyperpera in torneselli as the only coinage in the possession of a wealthy Jew of Crete.<sup>35</sup> Within 50 years the tornesello had replaced the soldino as the principal coin in circulation in Crete, the most important of Venice's Greek colonies.

<sup>33</sup> ADC, Sentenze Criminali, B. 48, f. 111–113v (22 Aug. 1368): “Una barilla erat plena turonensibus et altera erat semi plena soldinis et fuerunt inventi in tota illa pecunia XXVII ducati in auro.” When asked how many soldini she received, one of the participants in the theft “respondit se nescire quia non numeravit eos. Interrogata de quantitate tornesellorum, respondit quod dicti torneselli erant tanti quantum tenere poterant due mesure de illis cum quibus mesuratur vinum quod venditur ad spinam.” This might suggest that at that time soldini were counted while torneselli were considered in terms of volume, but the unusual circumstances of the statement make such an inference speculative at best.

<sup>34</sup> See above, n. 5: “Isti duo sachi reperiuntur; in uno quorum sunt yperpera quingenta [500] in turnensibus et in altero sunt ducati auro tringintatres[33] et yperpera nonaginta [90] in turnensibus.” See below, pp. 53–59, for a discussion of the relationship between the hyperperon of account and circulating coins.

<sup>35</sup> See above, n. 6: “ippa. V<sup>c</sup> in tornensibus,” followed by two letters of credit and physical objects. In Corfu, however, nearer to Venice and the northern Balkans where silver remained in circulation, an individual from Patras stored 210 hyperpera in torneselli and 247 hyperpera in “pecunia argenti”: E. Gerland, *Neue Quellen zur Geschichte des lateinischen Erzbistums Patras* (Leipzig, 1903), pp. 211–16, no. 6, 17 (28 Apr. 1430).

## MINTING AND DISTRIBUTION

Though intended for use in the Greek colonies and beyond, torneselli were minted in Venice. The original authorization specified that they be struck “hic,” and the testimony of an engraver from the following year spoke of the “torneselli which are currently being made in the mint.”<sup>36</sup> This would have been at the mint building in San Marco, where silver coins were struck. An order of 1385 prescribed a “locum separatum” for the minting of torneselli and piccoli, so that the copper would not get mixed in with the silver, implying at least a separate workshop for the base coins.<sup>37</sup> Such a separation appears to have been unsuccessful, because the Chalkis Hoard contains two coins (nos. 30 and 31) with tornesello obverses but soldino reverses, implying a common die storage area for the two coinages. The coin in the name of Michele Steno (1400–1414) must be after the 1385 order. The only tornese’li struck outside of Venice which can be interpreted as possibly authorized are the issues referred to in a proclamation of the duke of Crete of 1364 which called in all coins minted there during the rebellion of 1363; no such coins have been identified.<sup>38</sup>

In 1385 the number of Venetian mint masters was raised from two to three (as there had been in the past), with the new master designated specifically to be in charge of torneselli and piccoli.<sup>39</sup> In 1416 the separate office of master of torneselli was eliminated and supervision over the production of this coinage was rotated among the three silver masters; because of heavy production, the one in charge of torneselli was given four months to deliver his accounts instead of the usual two.<sup>40</sup> There

<sup>36</sup> See Appendix 4, 1, below, and n. 28, above.

<sup>37</sup> Appendix 4, 7, below.

<sup>38</sup> See above, n. 30.

<sup>39</sup> Appendix 4, 7, below.

<sup>40</sup> ASV, Senato, Misti 51, f. 121v-122; Capitolar dalle broche, f. 17v (30 Apr. 1416). The Capitolar dalle broche, now ASV, Zecca 5, is apparently the cartulary of



was a *scriba ad tornesellos* at least as early as 1376 with a salary of 40 ducats per year and a *pesator ad tornesellos* who earned 50 ducats annually.<sup>41</sup> Work was overseen by officials known as *gastaldiones*, and the standards of the coins were checked by *mendatores*; these officials were paid at a given rate per mark of metal coined.<sup>42</sup> Other workers involved in the production of the coinage were also paid according to the quantity produced.<sup>43</sup>

The silver that went into torneselli was acquired by one of two means, either as the proceeds of the *quinto* or as bullion freely sold to the mint. By the mid-fourteenth century all silver that came into Venice was subject to the *quinto*: bullion and coins had to be weighed at the official scales of the Rialto and one-fifth of all silver had to be sent to the mint at San Marco for recoinage at a specified rate of compensation.<sup>44</sup> In 1385 the entire proceeds from the *quinto* plus additional silver was allocated to the production of torneselli.<sup>45</sup> The rate of payment for this obligatory coinage varied throughout the second half of the fourteenth century, from 135 grossi per mark before 1369, to 168 in 1380 at the end of the War of Chioggia, down to 158 grossi per mark in 1390.<sup>46</sup> The *quinto* was abolished in 1417, but was replaced for a while by the similar

the Venetian mint masters: G. Bonfiglio Dosio, ed., *Il "Capitolar dalle Broche" della Zecca di Venezia (1358-1556)*, Biblioteca Winseman Falghera 1 (Padua, 1984), pp. 85-89.

<sup>41</sup> *Scriba*: Capitolar dalle broche, f. 2 (24 Aug. 1376) and Appendix 4, 7, below; *pesator*: ASV, Senato, Misti 37, f. 4, and Capitolar dalle broche, f. 4 (16 Sept. 1381); publ. in Bonfiglio Dosio, *Capitolar* (above, n. 40), pp. 37 and 44.

<sup>42</sup> ASV, Senato, Misti 41, f. 141r and v, and Capitolar dalle broche, f. 7v (30 May 1391); publ. in Bonfiglio Dosio, *Capitolar* (above, n. 40), pp. 56-58.

<sup>43</sup> Capitolar dalle broche, f. 7 (20 Jan. 139[1]); publ. in Bonfiglio Dosio, *Capitolar* (above, n. 40), pp. 53-54.

<sup>44</sup> ASV, Senato, Misti 33, f. 43 (19 Dec. 1369); publ. in Papadopoli (above, n. 2), 1, p. 345, 14.

<sup>45</sup> Appendix 4, 6, below.

<sup>46</sup> Above, n. 44. ASV, Senato, Misti 36, f. 92v and Capitolar dalle broche, f. 3v (2 Aug. 1380); publ. in Bonfiglio Dosio, *Capitolar* (above, n. 40), pp. 41-42, and in Cessi, *Problemi* (above, n. 18), pp. 168-69, 166. Capitolar dalle broche, f. 6v (29 Apr. 1390); publ. in Bonfiglio Dosio, *Capitolar*, p. 53, and in Cessi, *Problemi*, pp. 181-82, 181.

requirement of presenting one-quarter of incoming silver to the mint.<sup>47</sup> Silver that was brought to the mint voluntarily was purchased at a higher rate. In 1380, while the rate for the quinto was 168 grossi per mark, merchants were invited to bring in as much silver as they wanted at a rate of 175.5 grossi; such silver would be exempt from the quinto.<sup>48</sup>

Since 320 tornesello coins were to be made from a mark of alloy which was  $\frac{1}{9}$  silver, 2,880 coins could be made from a mark of silver. When silver cost 135 grossi per mark, as in 1369, the tornesello had an intrinsic value in silver of about  $\frac{1}{21}$  grosso. The value of the copper was much less than that of silver (no more than  $\frac{1}{25}$  of its value), so the intrinsic value of the tornesello would have been about  $\frac{1}{20}$  grosso. The grosso was not minted between 1354 and 1379, but it was nominally 32 piccoli, so the intrinsic value of the tornesello in 1369 was about  $\frac{32}{20}$  of a piccolo, that is a bit above one and a half piccoli. As the tornesello was defined as the equivalent of three piccoli, its extrinsic value was almost twice its intrinsic value when silver was as cheap as 135 grossi per mark. It was still 50 percent overvalued when the price of silver was as high as 168 grossi per mark. In any period, the tornesello was a greatly overvalued coin in relation to other coins in the Venetian system.

While the tornesello was introduced specifically as a replacement for the deniers tournois which circulated in Greece in the early fourteenth century and took its name from them, it did not mimic their appearance. The most distinctive feature of the denier tournois was the tower on the reverse, a pun on the name of the city of Tours in France, where the type was first minted (Plate 3, 42–48). On the obverse was a Greek cross pattée that is slightly splayed at the ends. The cross was separated from its legends by a circle; the tower was not.

The original authorization for the tornesello provided: “fiat super illa forma et cunio que videbitur dominio,” that is the appearance was left to the authorities.<sup>49</sup> The tornesello maintained the obverse cross of the

<sup>47</sup> ASV, Senato, Misti 52, f. 54, and in *Capitolar dalle broche*, f. 18v-20v. (11 Nov. 1417); publ. in Papadopoli (above, n. 2), 1, pp. 356–62, and in Bonfiglio Dosio, *Capitolar* (above, n. 40), pp. 90–98.

<sup>48</sup> See above, n. 46 (2 Aug. 1380).

<sup>49</sup> Appendix 4, 1, below.

denier tournois and the doge's name was put around it as the legend. On the other side, instead of the tower which had become a symbol of French monetary hegemony, there was placed the lion of Saint Mark, symbol of Venice. The lion had appeared earlier on the soldino, standing with a banner. On the tornesello it is seated with a book and surrounded by a circle and the legend *VEXILIFER VENECIARVM*, "standard bearer of Venice," thus representing in words the city's banner, which appeared on all high denomination Venetian coins.

It is not immediately apparent which side of the tornesello is the obverse. Such a consideration is not trivial. A designation of obverse and reverse on coins can be made on the basis of general appearance, content of legends, or technical considerations of production. From general appearance, it is tempting to consider the side with the lion, a complicated and emblematic image, the obverse of the coin, while that with the more common cross would be its reverse. The analogy of English and other medieval pennies with a royal portrait on the obverse and a cross reverse suggests this designation. However, it should be recalled that the tornesello was intended as a replacement for the denier tournois (for which the same ambiguity of obverse and reverse designation exists); the image which they share and hence which was considered the essential mark of the denomination, is the cross.

In terms of legend, the lion side identifies the issuing state of Venice, though indirectly, while the cross side identifies the elected doge in whose reign the coin was issued. It would involve a detailed discussion of Venetian political theory to determine which side represents the true issuing authority. Other Venetian coins offer no analogy, as on the ducat and the grosso the doge and Venice are represented on the same side, while on the soldino the side with the doge's name also bears his representation.

In purely numismatic terms, the reverse is usually considered the side struck with the punch die, while the obverse is in the anvil. This is by analogy to Greek and Roman coinage, in which the complicated obverse portrait was put in the anvil to protect it against the relatively harsher wear of the punch die. In the two reigns represented in the Chalkis hoard for which a count of dies has been made for both sides of the coins, Morosini and Moro, both show a lower number of dies for the cross side, implying that it was in the anvil. Moreover, on several coins

from the hoard, the strike was so off-center that the flan curled around a die, presumably the punch. In such cases it was the lion side that was concave, and so apparently struck from the punch or reverse die. From these technical and more general considerations, it can be concluded that the cross side was intended as the obverse of the tornesello, while the lion was a subsidiary reverse image.

The types of the tornesello, obverse and reverse, were engraved on the dies by hand. The image of the lion is rather complex and, even in coins of poor overall appearance, the actual die engraving appears to have been expert and exact. The head of the lion, however, is usually imprecise; the eyes can seldom be made out with clarity even in relatively unworn coins from fresh dies. It appears that the face of the lion was punched into the die; this punch usually went in deeper than the hand-engraved body, with the result that the full relief of the head was not brought up enough during striking to reveal details.

A clearer case for the use of punches in die preparation can be made by considering the letters of the legends. The use of letter punches for Venetian coins appears to have originated in the mid-thirteenth century; by the time of the introduction of the tornesello it was standard on ducats, grossi and soldini. A clear demonstration of the use of letter punches can be seen on the enlargement of the reverse of a coin from the Chalkis Hoard (Plate 4). In the legend the die sinker appears to have spelled out VEXILIFER VE and then punched the N of VENETIARVM over the E he had just put in, and continued on with the legend, producing a word which appears to be VNETIARVM, with an E visible under the N. Such overwriting would not have occurred with hand engraved letters, because the engraver would have had to look as he was lettering.

The recognition of letters made by punches is an important tool for identifying imitations of torneselli. During the study of the Chalkis Hoard, each coin was examined at least three times; any blunders in legend or unusual style of engraving were noted and such coins were segregated as imitations. In the course of the die study of the reverses of 290 coins of Tomaso Mocenigo, four coins of correct legend and style were found to have legends engraved in the dies by hand, rather than with punches. These coins were then classified as imitations on the grounds that it is more likely that imitators would have mastered the style of Venetian coins than that the Venetian mint would abandon its

use of punches for just a few dies within an issue. Torneselli of other doges were not examined as closely as those of Mocenigo, and it is possible that a number of coins classified as genuine are imitations, though probably not a significant percentage. In a review of 50 torneselli of Venier, all coins originally classed as genuine were found to have had legends made with punches, adding no new imitations to the attributions.

In every way, the care taken in the production of torneselli appears to have decreased in the course of the period from 1353 to 1423. The early coins are struck on evenly hammered, round flans; they are well centered and evenly struck. Beginning with Marco Corner (1365–68), the specimens include irregularly shaped flans and off-center strikes. This decline in care continues through Antonio Venier, in whose reign (1382–1400) off-center strikes become common; it is usually the reverse which is off center, less frequently the obverse, suggesting that the blank was placed on the engraved part of the anvil and was then struck with less attention with the reverse punch. Double strikes are often evident on both faces; sometimes the image was moved to the side from one strike to the other, sometimes it was rotated. Two coins of the Chalkis Hoard were double struck obverse to reverse, that is the flan flipped over between strikes. During the reigns of Steno and Mocenigo (1400–1423), the appearance of the coins degenerates further. The flans are poorly hammered and often more rectangular than round. The entire legend is rarely on flan, and the striking is frequently so uneven as to suggest that the punch was held at an angle. The frequency of visible double striking actually decreases in this period, presumably because the coins were struck only once, with no attempt to bring up relief on the whole surface. In contrast to this period of steady decline in striking, the few coins of the Chalkis Hoard after Mocenigo are of relatively good flan preparation and careful striking.

There does not appear to be a consistent die orientation for torneselli. The die axes for two reigns (Corner and Contarini) have been systematically investigated on the basis of the Chalkis Hoard; the distribution of the relative position of the top of the obverse to the top of the reverse (as defined by the cross at the beginning of each legend) is apparently random. There is, however, a slight, and probably not statistically significant, avoidance of the 6 o'clock (180°) orientation, which was standard for the grosso of the period.

Obverse and reverse legends of torneselli are frequently punctuated by dots, and this is the chief source of varieties among the coins of a given doge. It is tempting to discern in these stops a system of issue marking analogous to the initial which the master of silver had to place on the dies for soldini minted under his direction.<sup>50</sup> However, among the torneselli of Michele Morosini, presumably all minted during his four-month reign, seven different combinations of stops appear on the 20 known obverse dies, representing most of the combinations found on longer issues. If these combinations of dots do indeed have a meaning, it is evidently not an indication of the period of production.

In the analysis of the Chalkis Hoard, an attempt was made to divide the coinage of Andrea Contarini into eight groups on the basis of legend variants and that of Antonio Venier into five groups; in no instances were there significant metrological differences among these groups. In the reign of Contarini, the spelling of the reverse legend was altered from **VENECIARVM** to **VENETIARVM**, a change kept in all subsequent issues. For the Contarini torneselli, those with the old spelling are distinguished from the others by certain characteristics: the letters tend to be smaller, less Gothic in appearance and more evenly distributed; the ring around the reverse type is generally heavier; and strikes appear to be more even than on the presumably later group. The weight profiles for both groups, however, are the same.

On the coins of Venier there is a tendency for those with a retrograde **N** on the obverse to have it also on the reverse, and for a stop following the **O'** on the obverse to correlate with a retrograde **N**. Whether such groupings correspond to conscious privy marks or are the result of habits among engravers and supervisors has not been determined. Otherwise, most of the variants (a total of 20 observed among the obverses of Venier) appear to be random letter reversals caused by upside-down punches or combinations of stops. The distinction between a simple Greek cross and a cross potent at the beginning of obverse legends of Venier appears to result from the wear of punches, dies and coins; all obverse legends may have been intended to begin with a cross potent. On all of Venier's reverses, the cross of the legend is plain.

<sup>50</sup> See above, n. 20.



All evidence, documentary and numismatic, points toward all torneselli having been minted in Venice and then shipped to its colonies in Greece. A document of 1364 announces the sending to Crete of seven bags of torneselli containing 840 marks, that is each bag weighing 120 marks or 28.6 kg.<sup>51</sup> In 1403 the duke of Crete received 400 ducats worth of torneselli in four sacks; 100 soldi of torneselli (400 coins) were said to equal one ducat, so each sack would have had 40,000 coins.<sup>52</sup> In 1410 his successor sent torneselli to the captain general of the Gulf; eight sealed sacks contained a total of 4,000 hyperpera of Crete (512,000 coins) for a rate of 64,000 coins per sack.<sup>53</sup> A rate of 64,000 coins per sack is also evident when the captain of the Gulf acknowledged five years later the receipt of six bags of torneselli totalling 3,000 hyperpera.<sup>54</sup>

Venetian documents record the sending of torneselli to officials in the long-standing colonies of Crete<sup>55</sup> and of Coron and Modon,<sup>56</sup> as well as to the newly acquired colonies of Corfu,<sup>57</sup> Negroponte,<sup>58</sup> Nauplia,<sup>59</sup> and

<sup>51</sup> ASV, Senato, Segrete, L. Celsi, f. 116 (31 July 1364); publ. in V. Padovan, "Documenti per la storia della zecca veneta," *Archivio veneto* 13 (1877), p. 147.

<sup>52</sup> ADC, Ducali, B. 1, q. 3, f. 13v (2 Oct. 1403); publ. in F. Thiriet, ed., *Duca di Candia, Ducali e lettere ricevute (1358-60; 1401-05)*, Fonti per la storia di Venezia, Sect. 1 (Venice, 1978), p. 90, 93.

<sup>53</sup> ADC, Ducali, B. 1, q. 6, f. 45 (28 Aug. 1410); see the discussion at pp. 54-55 below for the determination of the number of torneselli to the hyperperon of Crete.

<sup>54</sup> ADC, Ducali, B. 1, q. 6bis, f. 34v (1 Oct. 1415).

<sup>55</sup> ASV, Senato, Misti 34, f. 158v-159 (15 Feb. 137[5]); summ. in F. Thiriet, ed., *Régestes des délibérations du Sénat de Venise concernant la Roumanie*, École Pratique, des Hautes Études, VI<sup>e</sup> Section, Documents et recherches 1, 2 and 4 (Paris, 1958-61), 1, p. 136, 552.

<sup>56</sup> ASV, Senato, Misti 47, f. 121v (31 June 1407); publ. in C. N. Sathas, ed., *Documents inédits relatifs à l'histoire de la Grèce au Moyen Âge* (Paris, 1880-90), 2, p. 177, 411. ASV, Senato, Misti 48, f. 117v (5 Dec. 1409); publ. in Sathas, 2, pp. 228-29, 478. ASV, Senato, Misti 50, f. 93 (2 Apr. 1414); summ. in Thiriet, *Sénat* (above, n. 55), 2, p. 122, 1524.

<sup>57</sup> ASV, Senato, Misti 40, f. 40r and v (12 Aug. 1386); summ. in Thiriet, *Sénat* (above, n. 55), 1, p. 172, 712. ASV, Senato, Misti 46, f. 16 (20 Apr. 1402); publ. in Sathas (above, n. 56), 2, p. 80, 299.

<sup>58</sup> ASV, Senato, Misti 48, f. 165 (24 July 1410); publ. in Sathas (above, n. 56), 2, pp. 245-46, 505, and summ. in Thiriet, *Sénat* (above, n. 55), 2, pp. 92-93, 1383.

<sup>59</sup> ASV, Senato, Misti 43, f. 137v (22 June 1396); publ. in H. Noiret, ed., *Documents inédits pour servir à l'histoire de la domination vénitienne en Crète de 1380 à 1485*, Bibliothèque des Écoles Françaises d'Athènes et de Rome, ser. 1, fasc. 61 (Paris, 1892), p. 81.

Lepanto.<sup>60</sup> Some dispatches of torneselli are specified as being for such expenses as the repair of ports and walls.<sup>61</sup> Some are for the outfitting of Venetian ships at various colonial ports.<sup>62</sup> Others are noted as being for the pay of Venetian officials (including the duke of Crete) and their retinue.<sup>63</sup> None of these documents mention the shipment of torneselli beyond the limits of Venetian sovereignty into the Greek mainland.

<sup>60</sup> ASV, Senato, Misti 51, f. 125 (14 May 1416); publ. in Sathas (above, n. 56), 3, p. 135, 689.

<sup>61</sup> See above, n. 55 (15 Feb. 137[5]), and n. 56 (31 June 1407).

<sup>62</sup> See n. 53 (28 Aug. 1410) and n. 58 (24 July 1410), above. Also: ADC, Ducali, B. 1, q. 10, f. 9 (23 Dec. 1422). ASV, Senato, Misti 55, f. 104v (31 Mar. 1425); publ. in Sathas (above, n. 56), 3, p. 284, 861, and summ. in Thiriet, *Sénat* (above, n. 55), 2, p. 225, 1977.

<sup>63</sup> See above, n. 60 (14 May 1416). Also: ASV, Senato, Misti 46, f. 134v, and ADC, Ducali, B. 1, q. 3, f. 36v (3 June 1404); publ. in Noiret (above, n. 59), p. 148, and in Thiriet, *Ducali* (above, n. 52), p. 139, 131. ASV, Senato, Misti 56, f. 23v (16 June 1426); publ. in Noiret (above, n. 59), p. 314.



## FINDS OF TORNESELLI

All reported finds of torneselli, in hoards or as stray finds, are from the Greek islands and mainland. None have been found in Venice or neighboring Italy, nor have they been found in excavations on the Dalmatian coast, in Asia Minor, or on Cyprus. All finds of torneselli known to this author are listed in Appendix 2 and are plotted on the map (Fig. 2, p. 28).

The largest known find of torneselli is the Chalkis Hoard lent to the American Numismatic Society in 1980 by John Aiello, an American coin dealer; it is catalogued in Appendix 1, below. According to Mr. Aiello, the 4,806 coins in the parcel represented the entire contents of a hoard recently unearthed in Greece. All of the coins had a similar green surface with a slight bluish cast; occasional pieces had spots of oxidized copper. All were basically of the same size and fabric, and none were datable to later than 1471. While it thus appears that there were no intrusions into the hoard, it is not possible to determine for certain that the hoard as examined was complete. The relative difficulty in reading the coins in their uncleaned state and the inclusion of an extremely rare coin of the Byzantine emperor Manuel II argue against a possible systematic removal of billon pieces. However, any coins of larger module, high silver content, or of gold would have stood out clearly and may have been culled before the hoard was examined. It is also possible that the parcel examined represented only a portion of the original discovery, though no lots of torneselli with similar distribution and patination have been observed on the market in recent years. The late date of this hoard by comparison with other hoards of torneselli is consistent with the identification of its provenance as Chalkis, capital of the Venetian colony of Negroponte, which fell to the Turks after a major siege in 1470.<sup>64</sup>

<sup>64</sup> W. Miller, *The Latins in the Levant* (London, 1908), pp. 470–78; D. E. Pitcher, *An Historical Geography of the Ottoman Empire* (Leiden, 1972), p. 87. See the note to Appendix 1, below, for a possible alternate provenance of the hoard.

In the spring of 1982 an additional parcel of 930 torneselli was brought to the ANS by the same dealer, who said that these were from a different hoard of unknown provenance. These coins appeared to have been poorly cleaned, so patination could not be used to compare them with those of the Chalkis Hoard. The new parcel contained coins only through Tomaso Mocenigo (1414–23). As later coins than this are rare in the Chalkis Hoard, their absence from this parcel does not conclusively label it a separate find. Moreover, other rare issues of the Chalkis Hoard (coins of doges before Marco Corner and of Michele Morosini) are also missing from this parcel, suggesting that it may have been culled for rarities, through even rare torneselli have little collector demand. The only internal evidence that this parcel represents a separate hoard is that the coinage of the most recent doge, Mocenigo, is represented proportionally half as strongly as in the Chalkis Hoard, suggesting that this parcel comes from a hoard buried before the end of his issue. In view of the uncertainty concerning this parcel, it will be considered separately from the Chalkis Hoard and is identified as the ANS 1982 parcel.<sup>65</sup>

In early 1983 Mr. Aiello presented a third parcel of torneselli to the ANS. These were characterized by a blackish surface with frequent bubbling of the metal, and many were firmly stuck together at the time of initial examination. A curious aspect of this parcel was the inclusion of crusader coins of the eastern Mediterranean of the same surface appearance, especially 44 billon deniers of the thirteenth century in the name of Bohemond, count of Tripolis. The mystery was explained by Edward Baldwin of A. H. Baldwin & Sons, London, who reported that his firm, in late 1982, had purchased 92 torneselli from a lot of several thousand torneselli and crusader coins which had been in the possession of a Beirut dealer whose shop had been burned in recent shelling, resulting in the melting of part of his stock. Presumably what the ANS received in 1983 was the portion of the stock which had been too damaged from heat to be marketable. The tornesello portion of this parcel may derive from the same hoard as the ANS 1982 parcel, as it contains about the same proportion of coins of the last issue. It also

<sup>65</sup> See Appendix 2, 30, below.

contains coins of scarce doges and was apparently not picked through for rarities. It is designated the ANS 1983 parcel.<sup>66</sup>

Also in early 1983, Philip D. Greenall, a London collector, was offered his pick from a parcel of 318 torneselli by an unidentified dealer. Though he kept only about half of the coins (including all of the rare ones), Mr. Greenall has kindly supplied a list of the complete parcel as he received it. The parcel contained torneselli only through Michele Steno, whose issue was represented proportionally higher than in other parcels of torneselli with later coins. While this would imply that the Greenall parcel derived from a hoard buried during the reign of Steno and hence before the ANS 1982 and 1983 parcels, the number of later issues in the latter parcels is not high enough to preclude the possibility that this group is, in fact, from the same find as one or both of them.<sup>67</sup>

The tornesello was first recognized as a separate Venetian issue for the Greek colonies as the result of a hoard found somewhere in the Peloponnesus in 1849 and described in a note the following year in a newspaper of Trieste.<sup>68</sup> This hoard, called the Morea Hoard from the medieval name for the Peloponnesus, contained deniers tournois of Louis IX of France, coins of similar types of Frankish rulers of Greece, and about 500 torneselli (exact numbers were recorded only for coins of poorly represented doges).

There is only one major hoard of torneselli from a controlled excavation, that found at Delphi in 1894 and published a few years later.<sup>69</sup> This find is of special interest for its strong representation of Frankish deniers tournois of various Greek mints and, especially, the large number of pre-debasement Venetian soldini, which apparently remained in circulation until the early fifteenth-century deposition of the hoard. The presence of good silver coins in this excavation hoard suggests that

<sup>66</sup> See Appendix 2, 31, below.

<sup>67</sup> See Appendix 2, 32, below. The proportion of coins of doges other than Venier in comparison to his is consistently higher in this parcel than in other finds. This suggests that a significant number of Venier coins were removed for separate sale before the offering to Mr. Greenall. For this reason, figures from this parcel have not been included in the calculations and discussions that follow on the volume of production of the tornesello.

<sup>68</sup> See Appendix 2, 33, below.

<sup>69</sup> See Appendix 2, 6, below.

FIGURE 1

## Major Finds of Torneselli

	Hoards											
	Chalkis		ANS				Morea		Greenall		Delphi	
	Hoard		1982	1983	1983	1983	Hoard		Parcel		Hoard	
	N <sup>a</sup>	I <sup>b</sup>	N	I	N	I	N	I	N	I	N	I
A. Dandolo (1343–54)	4	1			7	1	1	1	1	1	3	1
M. Falier (1354–55)	1	1										
G. Gradenigo (1355–56)	11	1			8	1	2	1	1	1	1	1
G. Dolfen (1356–61)	6	1			13	2	1	1	2	2	4	1
L. Celsi (1361–65)	47	2			50	6	6	2	13	11	12	1
M. Corner (1365–68)	97	4	7	1	57	7	10	2	24	21	59	5
A. Contarini (1368–82)	789	30	125	20	198	25	c. 100	25	51	45	383	31
M. Morosini (1382)	26	1			13	2	2	1	6	5	7	1
A. Venier (1382–1400)	2629	100	629	100	803	100	c. 400	100	114	100	1254	100
M. Steno (1400–1414)	698	27	132	21	429	53	8	2	106	93	216	17
T. Mocenigo (1414–23)	283	11	30	5	29	4	2	1				
F. Foscari (1423–57)	3	1										
C. Moro (1462–71)	17	1										
A. Barbarigo (1486–1501)												
Imitation and Uncertain	172	7	7	1	164	20					85	7
Total Torneselli	4783		930		1771		c. 532		318		2024	
Total Coins	4806		930		1876		c. 532		318		3796	

<sup>a</sup> N indicates the number of coins.

<sup>b</sup> I indicates the index figure, see p. 26.

such valuable pieces may also originally have been in at least some of the hoards whose contents became known only after they had reached dealers.

A group of torneselli was found together in recent excavations of the Athenian Agora, in an area south of the Stoa of Attalos.<sup>70</sup> These appear to represent a small hoard deposited early in the reign of Michele Steno, i.e. soon after 1400.

<sup>70</sup> See Appendix 2, 3b, below.



Excavations															
Zakynthos Hoard		Agora		Gastouni Hoard		Seltman		Athens, Acropolis		Athens,		Corinth		Isthmai	
		Stoa	Find			1963	Hoard			Agora					
N	I	N	I	N	I	N	I	N	I	N	I	N	I	N	I
										1	1	1	2		
2	1							1	2						
				1	1	1	1	1	2	2	1				
7	1			4	1	4	3	3	6	9	5	1	2		
20	4			11	4	13	8	11	22	20	11	2	5		
142	30	4	14	79	29	59	38	29	58	116	63	17	38	6	18
5	1			4	1					13	7	2	4		
469	100	28	100	276	100	154	100	50	100	184	100	44	100	34	100
51	11	1	4					14	28	33	18	8	18	8	24
								4	8	9	5	6	13	5	15
								1	2			1	2		
										22	12	22	49		
5	1	12	43	1	1	1	1	81	162	235	127	15	33	9	26
701		45		376		232		195		644		119		62	
701		45		379		232									

Two additional hoards of torneselli are from known sites, Gastouni<sup>71</sup> and Zakynthos.<sup>72</sup> The Gastouni find appears to have been buried shortly before 1400, that from Zakynthos soon after. A. J. Seltman has published information on two hoards of torneselli, both of unknown find spot. The one he published in 1963<sup>73</sup> appears to be representative of a total find, while the figures published for the 1964 group<sup>74</sup> suggest that arbitrary numbers of coins of each doge were chosen for a collector, making it unsuitable for comparison of representation of various issues.

<sup>71</sup> See Appendix 2, 8, below.

<sup>72</sup> See Appendix 2, 29, below.

<sup>73</sup> See Appendix 2, 34, below.

<sup>74</sup> See Appendix 2, 35, below.

Of coins found singly in Greek excavations, those of the Athenian Agora and of Corinth are published in a comprehensive and scholarly fashion and contain sufficient numbers of torneselli to be useful for comparisons.<sup>75</sup> A significant number of torneselli have also been found in recent excavations on the north slope of the Athenian Acropolis and at Isthmia.<sup>76</sup> Additional small finds of torneselli are reported from many other excavations in Greece and also as accessions to the Numismatic Museum in Athens.

Figure 1 presents a summary of the contents of the ten hoards of torneselli and four major excavations discussed above. The hoards are arranged in reverse order of presumed deposition, with the latest coming first. The left hand column for each find reports the actual known number of coins bearing the name of each doge (N). In order for the relative quantity of each issue to be compared for hoards with different deposition dates, an index (I) has been constructed using the best-represented doge, Antonio Venier, as a standard of 100 and the relative representation of each doge in a given find calculated in terms of this issue. So, with an index of 30 the issue of Contarini is about one-third as well represented in the Chalkis Hoard as that of Venier, while the index for this doge in all hoards reported ranges from 14 percent to 45 percent of the representation of Venier.

The relative proportion of the issues of each doge from hoard to hoard is reasonably consistent, suggesting that the contents of the hoards are representative of the coins circulating at the time of their deposition. The latest, the Chalkis Hoard, for all reigns appears to be somewhere in the middle of the representation; for example, its index for Contarini is 30, the same as for one other hoard, above five hoards and below three. The factor of gradual loss of older coinage does not seem to have operated significantly; Contarini is as well represented in comparison with his successors in the Chalkis Hoard, buried at least 80 years after his reign, as in the Gastouni and Seltman hoards, buried much earlier. Chalkis can then be taken as generally representative of circulation of torneselli in

<sup>75</sup> See Appendix 2, 3a and 4 a-b, below.

<sup>76</sup> See Appendix 2, 3c and 11, below.

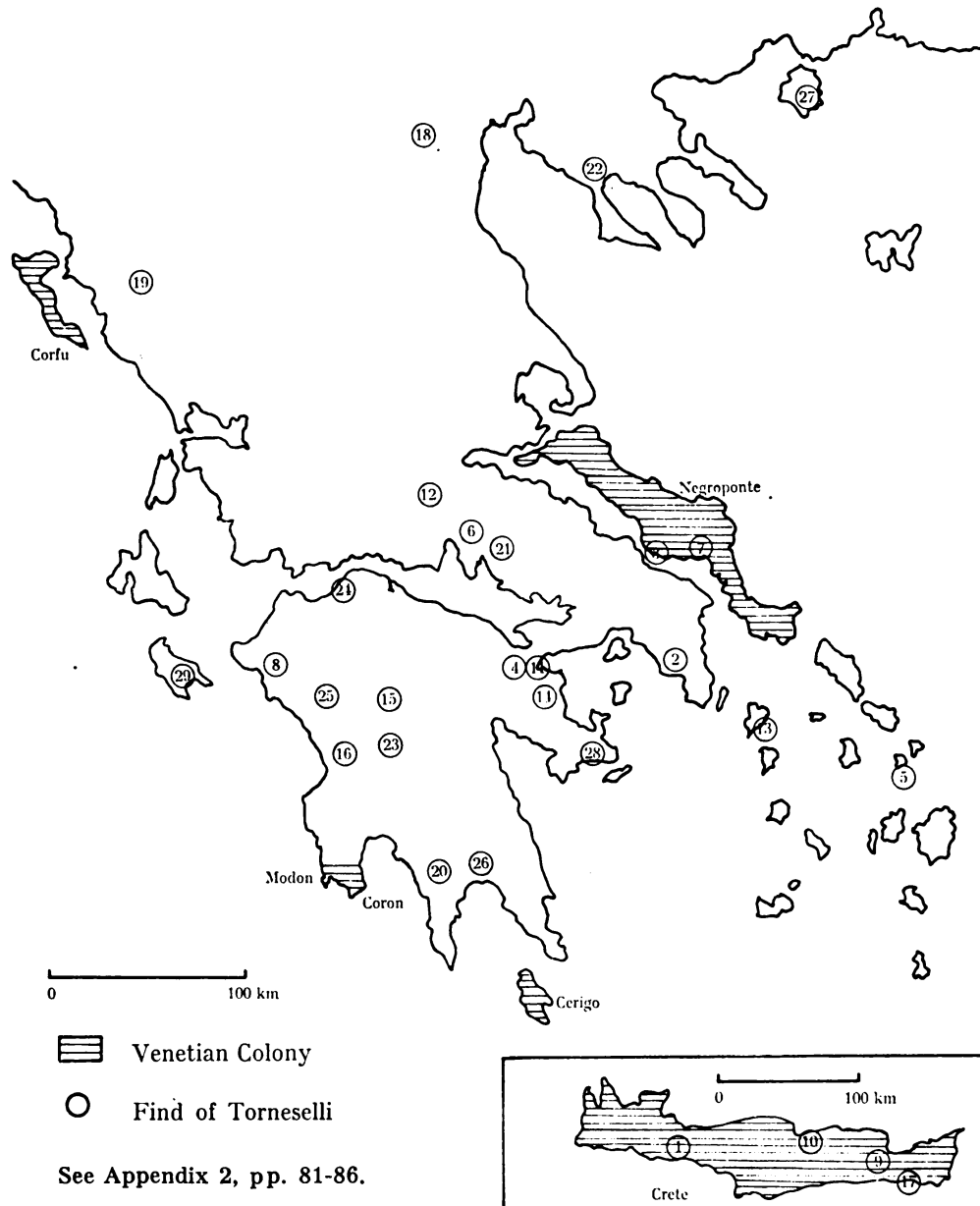
Greece throughout the period of the mid-fourteenth to the mid-fifteenth centuries.

The excavation finds appear to pose a problem because they show significantly different proportions of coins of the represented doges than the known composition of the hoards. For example, while the index figure for Contarini in the hoards ranges from 14 to 45 with six of the ten values between 25 and 31, for the four reported excavations the figures are 63, 58, 38 and 18. This might suggest that the coinage of Contarini is more significant in excavations than in hoards, implying possible geographical factors or a systematic culling of Contarini coins out of circulation in later reigns. A less involved explanation comes from an inspection of the number of unidentified coins from the excavations; in the two cases for which a figure is reported, the total number of torneselli unattributed is greater than the number assigned to Venier. Most of the coins of the Chalkis Hoard which were originally unattributed were eventually assigned to Venier; the poor striking of his coins tends to leave less evidence of the obverse legend than for earlier doges. One can suppose that in an excavation, where the coins are often significantly more corroded than in hoards, a great number of these poorly struck Venier coins would go unidentified. Moreover, a numismatist working on a site with coins from the ancient through the modern period would have less opportunity to identify such poorly struck coins than one studying a large hoard of only torneselli. So, it can be inferred that most of the unidentified coins in the excavations were poorly struck coins of Venier, and the apparent discrepancy between issue representation in hoards and excavations needs no further explanation. Due to the uncertainty concerning the unattributed coins in excavations, it is best to rely on the hoards alone for calculating the relative numbers of torneselli of each issue in circulation.

Figure 2 is a map of reported site finds of Venetian torneselli; documentation for these finds is presented in Appendix 2. The largest number of torneselli finds is from the Peloponnesus, the center of the Frankish principalities and site of much of the thirteenth century minting of deniers tournois. Several finds are from the northern areas of Epirus and Thessaly, which were under Byzantine, Albanian and Serbian rule in the fourteenth century and Turkish in the fifteenth. From the map

FIGURE 2

## Finds of Venetian Tornoselli



there can be no doubt that the tornesello, though minted ostensibly for the Venetian colonies, spread well into the mainland regions independent of Venetian rule. In fact, from such well-excavated sites as Athens and Corinth, the Venetian tornesello is by far the predominant coin minted in the period 1350 to 1450; at Athens it represents 97 percent of finds of coins minted in this period and at Corinth 92 percent. The tornesello must then be viewed as the principal low denomination coin of all of Greece in the later Middle Ages.



## WEIGHT STANDARDS

The extant authorization of 1353 set the standard weight for the tornesello at 320 coins to the mark, or about .75 g per coin.<sup>77</sup> There are no other known documents establishing the official weight of the denomination. In order to determine whether the mint actually followed this prescribed standard and maintained it through the more than a century of minting represented in the hoards, it is necessary to examine the coins themselves.

FIGURE 3

### Mean Weights of Torneselli, in Grams

	<i>Chalkis Hoard</i>	<i>ANS 1982 Parcel</i>	<i>ANS 1983 Parcel</i>	<i>Zakynthos Hoard</i>	<i>Gastouni Hoard</i>	<i>Athens, Acropolis Excavation</i>
A. Dandolo (1343–54)	.57		.54			
M. Falier (1354–55)	.60					
G. Gradenigo (1355–56)	.61		.59	.59		.56
G. Dolfin (1356–61)	.62		.60		.48	.48
L. Celsi (1361–65)	.61		.60	.61	.58	.44
M. Corner (1365–68)	.63	.61	.62	.63	.59	.53
A. Contarini (1368–82)	.64	.60	.63	.61	.59	.55
M. Morosini (1382)	.56		.58	.58	.54	
A. Venier (1382–1400)	.58	.55	.58	.58	.60	.49
M. Steno (1400–1414)	.55	.51	.55	.58		.50
T. Mocenigo (1414–23)	.52	.51	.50			.46
F. Foscari (1423–57)	.55					
C. Moro (1462–71)	.57					

<sup>77</sup> See Appendix 4, 1, below and discussion, pp. 7–8, above.

Figure 3 shows the mean weights of torneselli from the five hoards for which these are available and from the excavations of the North Slope of the Athenian Acropolis.<sup>78</sup> In no cases do any of the mean weights come near the prescribed .75 g. Several factors could account for a coin studied today being a different weight than it was when minted—wear from circulation, loss of metal while in the ground, and loss through cleaning. All variables must be controlled before inferences on the issue weight of a coin can be derived from the weighing of specimens.

Loss of metal through circulation is a function of the hardness of the alloy, the velocity of circulation of the particular denomination, and the mode of circulation (i.e. in sealed bags versus continual recounting). Base coins like the tornesello generally changed hands more often than higher denomination coins of fine silver and gold. All of the coins of the Chalkis Hoard show some wear, ranging from Very Fine condition (all details clear but evidence of wear throughout) down to Good (types and legends barely recognizable). The earliest Chalkis coins are smoother than the more recent ones, but are often more easily readable and, in the absence of uncirculated specimens for comparison, cannot be shown to be significantly more worn from their original relief than later coins.

The best way to estimate the degree of weight loss through wear for torneselli is to compare the Chalkis Hoard, comprising coins which circulated at least until 1462, with the Gastouni and Zakynthos Hoards, deposited at least 50 years earlier. The number of specimens is high enough to allow comparison only for doges from Celsi (1361–65) through Venier (1382–1400). This comparison reveals that in no case is the mean weight of a given doge's coins in the Chalkis Hoard less than that of coins of the same doge in both the Gastouni and Zakynthos Hoards. In the case of Contarini (the second most common issue), the Chalkis coins are even heavier than in any earlier hoard. The extra decades in circulation of the coins in the later hoard do not then appear to have led to a significant loss of weight, and loss through circulation cannot be considered an important factor in comparing the coins as examined with their weight at issue.

<sup>78</sup> See Appendix 2, below, for references. The Seltman 1964 Hoard shows unusually high mean weights, probably the result of the selection of choice specimens for sale to a collector; it is not included in the calculations.



The excavation coins from the Athenian Acropolis are lower in weight than those from any hoard for all issues under consideration. Their loss of weight is probably due to the fact that they were in the ground individually, while the hoard specimens were packed together, possibly in a container, where the outer coins would have shielded the inner ones from corrosion. The relative consistency of the metrology of the five hoards as compared with the significantly lower weights of the excavation coins implies that the hoard coins, as found, are reasonably close to their weight at burial; if they had lost significant weight in the ground it would be expected that one hoard would have lost consistently more weight than the others because of different subterranean environments.

A third possible source of weight loss after issue is through cleaning after discovery. The Zakynthos Hoard is reported to have been weighed before cleaning. The Chalkis Hoard coins all had a consistent patina (basically green with bluish toning; occasional coins had spots of oxidized copper) when they arrived at the ANS. In order to read the coins even to the point of identifying the doge, they had to be cleaned with a soft brush and rubbed lightly. Of ten coins cleaned this way, no coin lost more than .002 g, much less than one percent of its weight. For more detailed study, and for the careful sorting of 4,800 coins, this method proved slow and inadequate. Instead the coins were immersed in a dilute solution of Complexone (EDTA di-sodium salt) for five minutes, rinsed in water, allowed to dry, and brushed with a natural bristle brush. Of 150 coins weighed before and after such cleaning, the mean loss of weight was less than .01 g, or less than two percent.

In addition to loss through wear, corrosion and cleaning, culling sometimes results in a discrepancy between the theoretical weight of a coin and the weight of surviving specimens. Either at the mint or while the coins were circulating, heavy coins could be pulled out of the mass and put aside. If this was done at the mint, such coins would probably have been melted down and recut to the standard weight. A similar culling could be done at any time in the circulating life of a coin. These culled coins could then either be melted for their intrinsic metal or saved for export or future melting. Culling from circulation would be profitable only if the intrinsic (melt) value of the overweight coins was sufficiently above their legal value to make

such a procedure worthwhile. With highly overvalued coins such as the tornesello, culling from circulation is not likely.

Culling of heavy coins, at the mint or from circulation, results in a distribution with more coins below the theoretical weight than above it. Such a distribution appears skewed to the light side in a frequency table.

FIGURE 4

Weights of Torneselli of Venier in Chalkis Hoard (.01 g intervals)

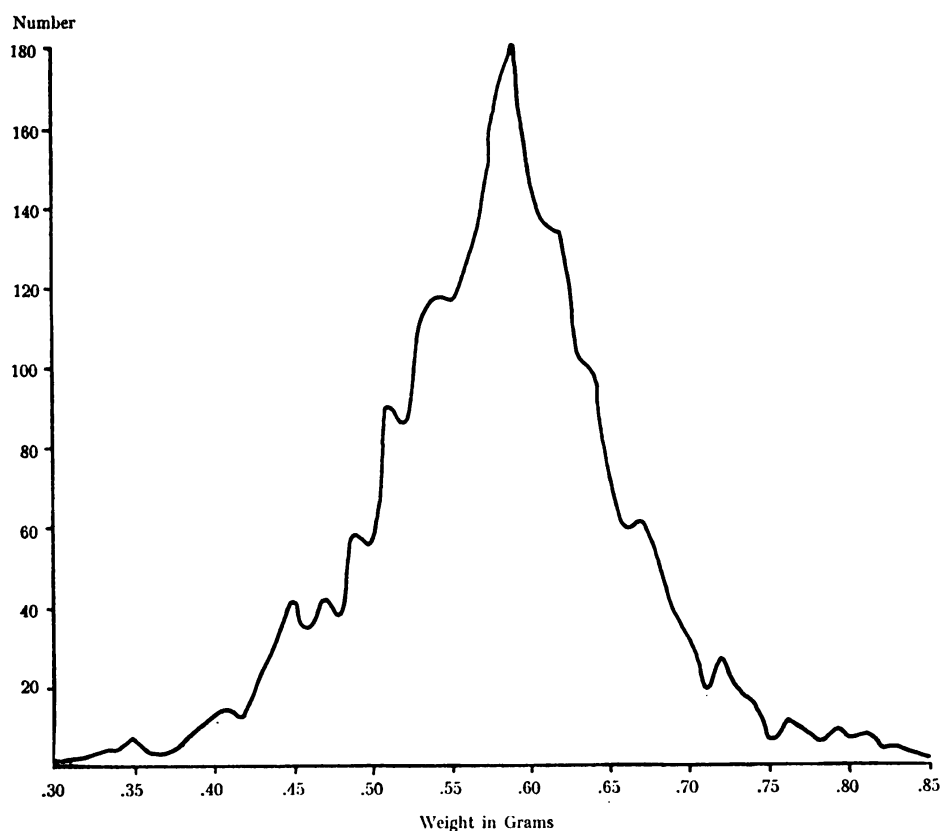
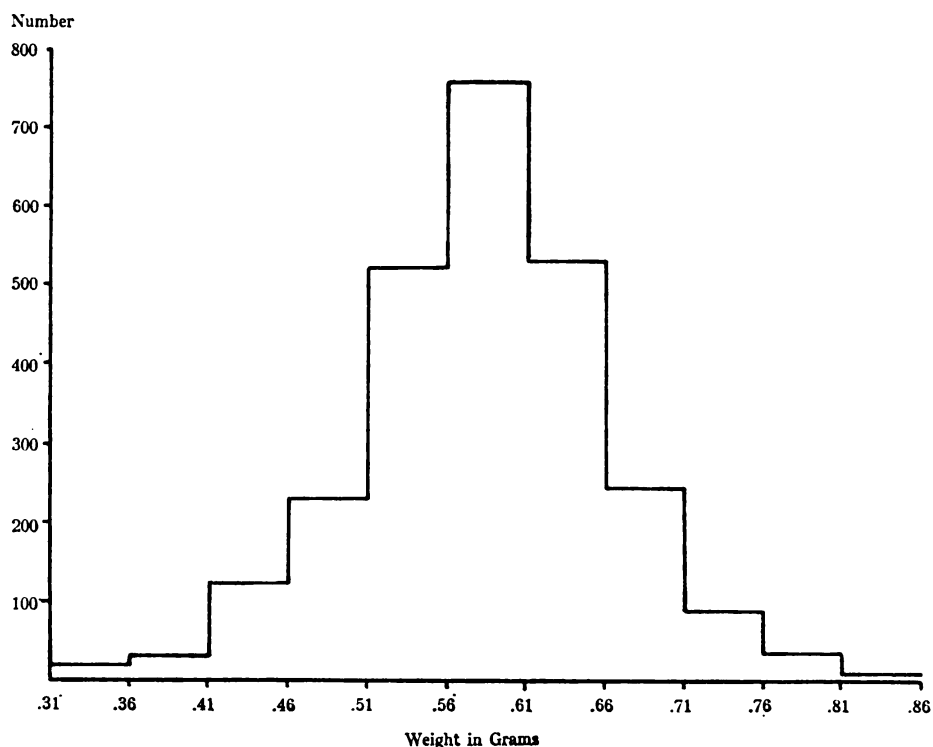


Figure 4 presents the weight distribution of the 2,629 coins of Antonio Venier in the Chalkis Hoard. The mean weight is .58 g. There is a clear modal peak at .59 g and an apparently even distribution above and below

this weight. This evenness is even clearer in Figure 5, where the weights have been grouped into intervals of five cg (which corresponds to the size of the Venetian grain), using the mean weight of .58 g as the center of the central group. In a normal distribution of values around a mean, 16 percent are less than one standard deviation below the mean and 16 percent are more than one standard deviation above it. For the coins of Antonio Venier in the Chalkis Hoard, the standard deviation is .08 g; 15 percent of the coins are more than one standard deviation below the mean of .58 g and 13 percent are more than one above. The distribution for these coins, then, is close to normal and this argues against the likelihood of any systematic culling of heavy coins either at the mint or from circulation.

FIGURE 5

Weights of Torneseello of Venier in Chalkis Hoard (.05 g intervals)



While the normal distribution implies that there was no removal of heavy coins, and the comparison of hoard and excavation weights indicates that there was no significant weight loss due to wear, corrosion or cleaning, weight loss due to clipping remains a possibility. All Venetian coins of the later Middle Ages had beaded borders on obverse and reverse to mark the limits of the surface and thus to allow the detection of any clipping. Torneselli, however, were rarely struck carefully enough to include the complete border on both faces of a given coin; usually one side or the other is off center. The flans themselves appear to have been cut angularly, rather than round like the beading on the dies. This is especially common for coins minted after 1382.

The Venetians do not seem to have been concerned about the danger of torneselli being clipped. A decision of the Quarantia of 1391 directed the removal of clipped coins from circulation and the reimbursement by weight in grossi and soldini respectively, indicating that these were the coins in question; no mention was made of torneselli.<sup>79</sup> However, torneselli were not intended to circulate within Venice, so their clipping would not have disturbed merchants at home as would the clipping of soldini and grossi. In Crete the official who was responsible for verifying the scales of goldsmiths also had the responsibility of weighing torneselli, but this was probably to check that sealed sacks had the right total weight, rather than to verify individual coins.<sup>80</sup> Shearing 0.1 g of metal from each tornesello (about one-sixth of the total weight) would have yielded about one-half kg of alloy from the 4,800 coins of the Chalkis Hoard, amounting to 50 g of pure silver, or one-fifth mark. It is doubtful that the cost of clipping and refining this metal would be less than the 35 grossi that such an amount of silver would net.<sup>81</sup>

<sup>79</sup> Capitolar dalle broche, f. 7 (19 May 13[9]1); Bonfiglio Dosio, *Capitolar* (above, n. 40), p. 55, and in Cessi, *Problemi* (above, n. 18), pp. 183-84, 185. The document bears the date 1381 in the MS, but is among other documents of 1391 in this chronologically arranged capitulary and bears an indictional year of 14, which corresponds to 1391.

<sup>80</sup> ADC, Ducali, B. 1, q. 11, f. 12v (21 June 1424): "... ellectus in officio ponderandi tornesia, bullandi laboraria argentea et justandi bilantias civitatis Candide aurificum et apothecarium."

<sup>81</sup> See above, pp. 12-13, for figures on the price of silver in this period.

A microscopic examination of the edges of torneselli from the Chalkis Hoard indicates that in most cases there are no visible raised burrs which would be left by shears used after striking. Rather, the cutting marks appear to have been hammered down by the dies, and there is evident metal flow out of the areas of low relief, indicating that the cutting was done before striking. This is true even for coins with irregular and jagged edges and for coins whose surface is considerably smaller than the die. In fact, there is no strong correlation between flan module and weight; many apparently undersized coins are at or above mean weight due to greater thickness.

If there has been no significant loss of metal due to wear, corrosion or cleaning, and if culling and clipping do not appear to have been common for torneselli, the weights of coins in the hoards can be used to estimate the weight of the tornesello at minting. As there was some weight loss in cleaning (which may have removed surface deposit as well as oxidized metal) and some additional loss from wear and corrosion of hoard coins, it is best to allow about five percent for total loss, meaning the addition of .03 g per coin to the actual recorded weight. Even if there was significant weight loss from any of the factors discussed above, there is no reason to suppose that it was systematic. The relative weights of the coins as they appear in the hoards represent at least their relative weights as minted.

The most apparent aspect of the weights listed in Figure 3 (p. 31) is that in no case are the observed values for the issue of any doge near the .75 g prescribed in the 1353 authorization. If the conclusion that there has been no significant weight loss after minting is valid, it must be concluded that the mint of Venice was issuing these coins below the prescribed weight. One possible explanation is that the document we have does not represent the final standards of minting. It exists only in the registers of the Quarantia and was not copied into the Capitolar dalle Broche, a compilation of regulations governing minting. The standards may have been changed before they took effect or in a subsequent year. It is not unlikely that such official decisions would be unknown today, since the registers of the main deliberative bodies of Venice are not complete for this period. The 1353 authorization itself was unknown until the present century.

A letter of Doge Celsi of 1364 to the officials of Crete announced a shipment of 840 marks of torneselli worth 1,050 ducats.<sup>82</sup> As will be discussed below, pp. 61-66, the value of the ducat in terms of torneselli varied with time; in 1364 it was about 73 soldi or 292 torneselli per ducat. The 1,050 ducats worth of torneselli would then be 306,600 coins. Dividing this sum by 840 marks yields 365 torneselli to the mark, rather than 320 as inferred from the 1353 document. With the Venetian mark weighing 238.5 g, the average weight of a tornesello would then be about .65 g.

An act of the Venetian Senate of 1386 equated 12,000 marks of torneselli with 13,000 ducats.<sup>83</sup> The figure of 80 soldi of torneselli per ducat (320 tornesello coins) appropriate for this period results in a calculation of 347 torneselli to the mark, again implying a recognized weight of well below the 320 coins to the mark of the 1353 authorization. This would result in a tornesello with a mean weight of .69 g. From these documents it appears that Venice recognized that the tornesello ought to weigh about .65 g in 1364 and .69 g in 1386.

The four coins of Andrea Dandolo in the Chalkis Hoard, which must have been issued before his death in 1354 and hence within a year of the original authorization, have a weight range of .52 to .61 g. Those in the ANS 1983 parcel weigh between .47 and .58 g and the two in the Seltman 1964 hoard weigh .60 and .62 g respectively. The two Dandolo torneselli published in the *Corpus Nummorum Italicorum* have weights of .52 and .67 g.<sup>84</sup> These 15 specimens have a mean, a median, and a modal weight all at .56 g. Even with an allowance for weight loss after minting,

<sup>82</sup> See above, n. 51.

<sup>83</sup> See Appendix 4, 8, below. Lazari (above, n. 13), p. 71, and Cessi, *Problemi* (above, n. 18), p. 179, 177, presumably following the Capitolar dalle broche, give the resultant value of the torneselli as "ducatorum XIII mille." I follow here and in the transcription below the reading in the Misti of the Senate, which reads "XIII mille" on the assumption that this text represents a more direct transmission of the actual deliberation of the Senate. If the 14,000 ducat figure is used, the resultant recognized weight for 1386 would be about .64 g, or about the same as in the 1364 document. This would imply that the rise in weight evident in the reign of Contarini from hoard evidence had been eliminated by 1386.

<sup>84</sup> See Appendix 1; Appendix 2, 31 and 35; *Corpus Nummorum Italicorum* 7 (Rome, 1915), p. 77.

it appears that the earliest issue of the tornesello was below the .65 g deduced from the 1364 document as well as below the .75 g calculated from the 1353 authorization.

From the weights of coins in the hoards presented in Figure 3 (p. 31), it appears that the weight of the tornesello increased sometime after this first issue, reaching a maximum by the reigns of Corner (1365–68) and Contarini (1368–82). A drop appears evident around 1382, but the number of specimens from the brief reign of Morosini in 1382 is too few to ascertain whether the decline happened before or after this year. A change in the spelling of the reverse legend of the torneselli occurred in the reign of the preceding doge, Contarini, which might indicate a change in the standard, but in the Chalkis Hoard, the 43 coins with the old spelling have the same mean weight as the 747 specimens with the new legend. The 1386 document suggests that the recognized weight early in the reign of Venier was about .69 g. If this is so, the standard must have fallen soon thereafter to bring the mean weight for the enormous issue of this reign significantly under that of previous decades. To judge from the mean weights for the coins of the succeeding doge, Steno, this drop during the last two decades of the fourteenth century must have been on the order of about .05 g. The coins of Venier in the Chalkis Hoard have been divided into five stylistic groupings, but no significant weight differences were found among these groups to suggest a stylistic change corresponding to a weight reduction during the reign.

From the combination of hoard and documentary evidence, it would appear that during the first decade after its introduction in 1353, the tornesello was struck at about 365 coins to the mark, or a mean weight of about .65 g per coin. In the next two decades its weight appears to have risen to about .69 g. Sometime after 1386 it dropped sharply, to roughly .60 g per coin.

Not only did the mean weight of torneselli change with time, but the extent of variation of specimens around that mean also fluctuated. In 1391, the Senate decreed that soldini had to be minted within a range of between 62 and 65 coins to the ounce (one-eighth of a mark), that is within a range of .459 to .481 g per coin.<sup>85</sup> Several weeks later,

<sup>85</sup> ASV, Senato, Misti 42, f. 8r and v, and Capitolar dalle broche, f. 8 (11 July 1391); publ. in Bonfiglio Dosio, *Capitolar* (above, n. 40), pp. 58–59.

on the protestation of mint officials that this margin was too narrow, the tolerances were broadened to between 61 and 66 coins to the ounce, that is from .452 to .489 g.<sup>86</sup> This greater tolerance is about 4 percent above and below the central weight. The tolerance prescribed for the tornesello is not recorded, but in the same documents it was noted that the officials in charge of verifying weights, the *mendatores*, preferred to work on torneselli and that only those who did their turn on soldini should be allowed to check torneselli. This preference for working on torneselli may be because pay for these officials was determined by the total weight of coins examined, and each tornesello weighed more than a soldino. It may also be that the weight of the tornesello had a tolerance broader than the 4 percent allowed for the soldino, making its verification easier.

The range of weights of the tornesello as measured by the standard deviation of weights in the Chalkis Hoard increases with time. For coins of Lorenzo Celsi (1361–65) the standard deviation is .04 g, giving a coefficient of variation of 6 percent. This means that about two-thirds of the coins fall within 6 percent of the mean weight. In successive reigns this coefficient rises; it is 8 percent under Marco Corner (1365–68), 9 under Andrea Contarini (1368–82), 14 under Antonio Venier (1382–1400), 18 under Michele Steno (1400–1414), and 21 under Tomaso Mocenigo (1414–23). In no period is the coefficient of variation of the tornesello as low as the 4 percent total variance prescribed for the soldino in 1391. The increase in the coefficient of variation of the weights of the tornesello is a reflection of a decreased concern for producing coins at a standard weight which parallels the decreased concern with the appearance of the coins in the same period.

<sup>86</sup> ASV, Senato, Misti 42, f. 13r and v, and Capitolar dalle broche, f. 8 (20 July 1391); publ. in Bonfiglio Dosio, *Capitolar* (above, n. 40), pp. 59–60.



## FINENESS

In view of the fact that the original weight of the tornesello appears to have been below that specified in the 1353 authorization, it might be suspected that the fineness would fall below the 11 percent silver specified. It has also been suggested that the fineness of the tornesello was reduced in the middle of the fifteenth century along with that of other Venetian billon coins.<sup>87</sup> In the Middle Ages, the percentage of silver in a billon alloy was more difficult for a user to determine than the weight, so unannounced alteration in the intrinsic content of a coin was usually effected in fineness rather than in weight.

Similar difficulties in measuring the silver content of such coins persist today and, short of sacrificing coins to destructive chemical analysis, there is no fully reliable and convenient method of analysis that can be easily applied to a large number of specimens. Through the kind cooperation of Professor Peter Gaspar of Washington University in Saint Louis, 30 coins from the Chalkis Hoard were analyzed for silver content using an experimental form of neutron activation analysis.<sup>88</sup> Low energy activation was used to produce about 200 counts per minute of silver-110 isotope. Reference disks were made of similar fabric to the torneselli to equalize the effects of neutron self-shielding. The coins and standards were individually irradiated with neutrons and the induced radioactivity was counted. The percent silver was calculated by comparing specific activities under the assumption that self-shielding was equalized

<sup>87</sup> Papadopoli (above, n. 2), 1, p. 273.

<sup>88</sup> A detailed report on the methodology and results of this analysis was presented by P. Gaspar and this author at the Symposium on the Use of Scientific Techniques for Studying the Coinage of Europe and the Mediterranean World in the Period A.D. 500–1500, held at the British Museum in April 1984; publication is forthcoming. The same methodology has been used on late Roman *siliquae*, C. Morrisson and J. H. Schwartz, "Vandal Silver Coinage in the Name of Honorius," *ANSMN* 27 (1982), pp. 168–69, n. 20.

in the coins and the standards. Each measurement was repeated at least three times, giving a minimum of four identical measurements per coin for each method used. The probable error is rather large because of the low levels of radioactivity employed; for a coin measured at 10 percent silver, the probable error is about 20 percent, with the actual silver in the coin ranging from 8 to 12 percent.

Coin 17 was also tested by two other methods of analysis to verify the results of this procedure. In the Gaspar method, this tornesello of Antonio Venier tested as having  $12.1 \pm 2.4$  percent silver. By Gordus's "Method 3" the same specimen was given a value of  $12.0 \pm 3.0$  percent silver.<sup>89</sup> The coin was then cut in quarters and one quarter sent to Galbraith Laboratories for chemical analysis, where it was reported to have 10.91 percent silver. The agreement of these three measures is sufficiently close to give confidence in the figures produced by the Gaspar method. The results of Gaspar's analysis are included in the catalogue of the Chalkis Hoard in Appendix 1, below. The average fineness for each reign is given in Figure 6.

The 25 torneselli tested have a mean silver content of 11.7 percent; most fall between 11 and 14 percent silver, only three have less than 10 percent. Except for one coin of Lorenzo Celsi (1361–65), all fall within the 20 percent probable error of the theoretical fineness of 11 percent silver. Three coins identified on the basis of style as imitations of torneselli were found to have less than 5 percent silver in their alloy, and two deniers tournois in the Chalkis Hoard, minted in the early fourteenth century, had less than 2 percent silver. The coin of Celsi with only 6 percent silver has peculiarities in its reverse legend and may be an imitation (Plate 1, 5).

There is no apparent trend in fineness among the torneselli of the Chalkis Hoard; no change in alloy corresponds to the apparent lowering in weight at the end of the fourteenth century. It appears that the mint of Venice maintained the fineness near the prescribed 11 percent silver through over a century of minting. We are then left with the anomalous situation in which Venice appears to have issued torneselli at full alloy,

<sup>89</sup> A. A. Gordus, "Quantitative Non-Destructive Neutron Activation Analysis of Silver in Coins," *Archaeometry* 10 (1967), pp. 78–86.

FIGURE 6

## Silver Content of Torneselli in the Chalkis Hoard

	<i>Number Tested</i>	<i>Percent Silver</i>
A. Dandolo (1343–54)	1	13.4
M. Falier (1354–55)	1	12.4
G. Gradenigo (1355–56)	1	11.7
G. Dolfín (1356–61)	1	12.4
L. Celsi (1361–65)	1	6.0
M. Corner (1365–68)	2	12.2
A. Contarini (1368–82)	4	12.0
M. Morosini (1382)	2	10.4
A. Venier (1382–1400)	4	11.8
M. Steno (1400–1414)	2	10.1
T. Mocenigo (1414–23)	2	13.1
F. Foscari (1423–57)	2	13.6
C. Moro (1462–71)	2	11.2

while minting them on a declining weight standard through the late fourteenth and early fifteenth centuries.

Several explanations suggest themselves. Despite the considerations developed in the previous chapter, the weights of the coins in the hoards may be significantly below the weight at minting, but this would not explain the relative heaviness of the earlier coins in the hoards. Alternatively, the 1353 authorization may have been amended with new weight standards, the documentation for which has not survived. A third possibility is that the actual intrinsic value of the silver in the tornesello was so far below the coin's exchange value that the amount of silver in each piece was not important. What may have been important, however, in maintaining confidence in the denomination was that the tornesello coinage as a whole be up to the prescribed fineness, that is 11 percent silver. This would be most understandable if the coinage circulated by weight rather than by count, which may have been the case outside of the Venetian colonies.



## VOLUME OF PRODUCTION

There are no extant mint records of medieval Venice. For torneselli, however, there are two documents which give indirect evidence for the numbers issued. In 1375 two weighers at the mint complained that instead of the 2,000 ducats worth of torneselli on which they used to work, they now had to work on 20,000 ducats worth.<sup>90</sup> Neither the time span in which this increase had occurred (both men had over 14 years seniority) nor the length of time in question for this quantity is specified. Such a ten-fold increase in minting might be exaggerated by employees who were petitioning for (and were granted) a raise in salary. However, if one assumes the figure is accurate and refers to a year's production, one can calculate the number of torneselli that would have been worth 20,000 ducats at that time. Documents give an exchange rate of 73 soldi of torneselli (i.e. 292 coins) to the ducat for this period, making the annual output implied in this document of 1375 a total of 5,840,000 coins.<sup>91</sup>

In 1386 the Venetian Senate, allocating the profits of an annual minting of torneselli, noted that these coins were equivalent to 13,000 ducats.<sup>92</sup> Following the appropriate exchange rate of about 80 soldi of torneselli to the ducat, we arrive at an estimate of 4,160,000 coins for the 1386 minting.<sup>93</sup>

To get a more complete picture of the changing volume of production it is necessary to examine the evidence from hoards. For this purpose, the proportion of coins of each doge's issue in the hoards is taken to represent the relative volume of torneselli minted in his reign. In Figure 7 the doges represented in the recorded hoards are listed, followed by an

<sup>90</sup> ASV, Maggior Consiglio, Grazie 17, f. 55v (10 July 1375): "Consueverant laborari ducati II<sup>m</sup> de torneselis, ad presens laborantur pro ducatis XX<sup>m</sup>"; publ. in Bonfiglio Dosio, *Capitolar* (above, n. 40), p. 37, n. 2.

<sup>91</sup> See Appendix 3, below.

<sup>92</sup> See Appendix 4, 8, below.

<sup>93</sup> See Appendix 3, below.

average of their coin indices summarized in Figure 1 (see p. 24). For doges whose coins close a hoard, i.e. Steno and Mocenigo, only those hoards buried after their reign have been included in the average. The next column gives the length of each doge's reign in years. The final column gives the relative number of coins issued per year by each doge, using the volume under Venier as an index of 100.

FIGURE 7  
Annual Index of Minting of Torneselli

	<i>Index<sup>a</sup></i>	<i>Reign in Years</i>	<i>Annual Index</i>
A. Dandolo (1343–54)	0.3	1.1	5
G. Gradenigo (1355–56)	1.2	1.3	17
G. Dolfín (1356–61)	0.5	4.9	2
L. Celsi (1361–65)	4	4.0	18
M. Corner (1365–68)	4	2.5	29
A. Contarini (1368–82)	27	14.5	34
M. Morosini (1382)	1.0	0.3	60
A. Venier (1382–1400)	100	18.1	100
M. Steno (1400–1414)	26	13.0	36
T. Mocenigo (1414–23)	11	9.2	22
F. Foscari (1423–57)	0.1	34.5	0.1
C. Moro (1462–71)	0.6	9.5	1

<sup>a</sup> Very small percentages are reported in tenths.

It will be noted that the minting rate rises in the fourteenth century, from indices under 18 in the 1350s, to a range of 18 to 29 in the 1360s and to 34 under Contarini, whose reign was 1368 to 1382. Morosini's brief reign of four months in 1382 shows a minting rate at 60 percent of that of Venier, suggesting that the acceleration was rapid by that year, but the numbers for his reign are small and not necessarily significant. Other than the case of Morosini, the minting rate during Venier's reign

is more than twice that of any other doge. Production appears to have dropped off soon after 1400, with the index down to 36 for Steno, who reigned until 1414 and to 22 for Mocenigo in the succeeding decade. To judge from Chalkis, the only hoard containing issues after Mocenigo, minting of torneselli was almost nil during the next 50 years, during the reigns of Foscari and Moro.

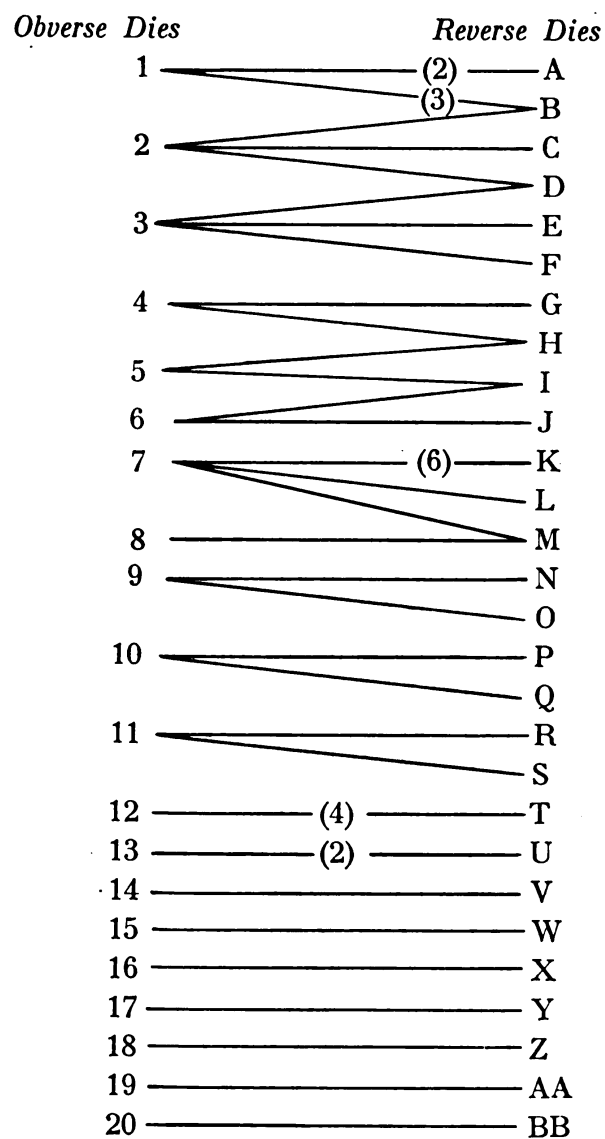
To move from a calculation of relative minting rates to an estimate of the actual issue sizes involves a die study. In a die study, surviving specimens of an issue are compared to determine how many dies are represented among them. This is a time-consuming process, and for the Chalkis Hoard only the coinage of doges with relatively few coins could be so studied. For issues of Gradenigo (1355–56), Morosini (1382), and Moro (1462–71), die studies were performed on both obverses (cross) and reverses (lion) of all coins from the Chalkis Hoard. For Tomaso Mocenigo (1414–23), only the reverses were compared, due to the relatively large number of specimens (284), difficulties caused by poor striking, and the limited amount of time the coins were available for study.

For the torneselli of Gradenigo in the Chalkis Hoard there were 10 reverse dies among 11 coins for a die duplication rate of 1.1; for the 26 coins of Morosini, there were 20 reverse dies (1.3); for Mocenigo, 267 reverse dies among 283 coins (1.1); and for Moro 14 reverse dies out of 17 coins (1.2 duplication rate). These duplication rates for reverse dies are consistent enough to suggest that the Chalkis Hoard contains a representative sample of tornesello issues through the century represented.

For the issue of the four-month reign of Morosini, a die study was made which included the 26 torneselli from the Chalkis Hoard, 13 from the ANS 1983 parcel, 4 from the Gastouni Hoard (from casts kindly supplied by the Athens cabinet), 1 in the Papadopoli collection in Venice, 1 in the Boutacin collection in Padua, and 1 in the ANS collection since 1934. For these 46 specimens, 20 different obverse dies were counted and 28 reverse dies. Figure 8 shows the linkage between obverse and reverse dies for these coins; a line represents a single specimen with the indicated die combination, and a parenthetical number represents multiple specimens from the same die pair. The range of linkage is too limited to allow deductions about mint organization and practices or the sequence of die use.

FIGURE 8

Die Linkage of 46 Tornoselli of Michele Morosini





Once the die duplication rate has been established, statistical techniques can be used to project the probable total number of dies used in the issue. In 1965, C. S. S. Lyon formulated a procedure for estimating the original number of dies employed in an issue, which Giles Carter has recently refined using a computer simulation to account for variable coin productivity per die.<sup>94</sup> On the basis of Carter's formula, for the 20 known obverse dies among 46 coins of Michele Morosini, one can calculate a theoretical total of 29 obverse dies used in the whole issue. As the amount of duplication in the sample is relatively low, one has to allow a range of possible error. In this case the calculated range of possible values for the total number of original obverse dies goes from 25 to 33; for the reverse, calculations project an original 58 dies, with a range from 48 to 68.

To go from a calculation of the number of dies used in a coinage to an estimate of the number of coins minted requires a figure for the number of coins that were struck from each die. This relies on empirical evidence rather than statistical theory. The best evidence for a coinage comparable to the tornesello is for English pennies of the thirteenth and fourteenth centuries. For the coinage of the Shrewsbury mint in 1249–50, J. D. Brand has counted 37 obverse dies and 86 reverse dies among 304 specimens.<sup>95</sup> From records of the value of this coinage as issued, he calculated an average of about 46,500 coins per obverse die and 20,000 per reverse, on the assumption that all dies were represented in his sample. Application of Carter's new formula suggests that virtually all obverse dies were indeed represented, while the total number of original reverse dies was likely to have been about 104, implying about 16,500 coins per reverse die.

In another study, documentary data for numbers of dies used at various English mints under Edward I and Edward II have been compared with records of numbers of coins minted.<sup>96</sup> In this case an as-

<sup>94</sup> C.S.S. Lyon, "The Estimation of the Number of Dies Employed in a Coinage," *NCirc* 1965, pp. 180–81; G. F. Carter, "A Simplified Method for Calculating the Original Number of Dies from Die Link Statistics," *ANSMN* 28 (1983), pp. 195–206.

<sup>95</sup> J. D. Brand, "The Shrewsbury Mint, 1249–50," in R. A. G. Carson, ed., *Mints, Dies and Currency: Essays Dedicated to the Memory of Albert Baldwin* (London, 1971), pp. 129–50.

<sup>96</sup> M. Mate, "Coin Dies under Edward I and II," *NC* 1969, pp. 207–18.

sumption was made that one-third of the total dies used by a mint were used for the obverse and two-thirds for the reverse, based on empirical observations from cases such as that of the Shrewsbury mint. According to this evidence, under Edward I an average of about 39,000 coins were struck from each obverse die, while under Edward II the average was about 28,000. The number of coins per reverse die is calculated as half of each figure. In all, the English figures show a range of 28,000 to 46,500 coins per obverse die and 14,000 to 20,000 per reverse. As a rough approximation, the midpoints of these ranges can be taken: 37,000 coins per obverse and 17,000 per reverse die.

Torneselli have a very high proportion of copper compared to English sterling pennies, so one might expect that this harder alloy would cause more die wear than almost pure silver. On the other hand, the torneselli are of lower relief than the English pennies and are usually less fully struck. There is no reason to suppose that the equipment or minting techniques of the mint of Venice around 1400 would have been less efficient than in the provincial mints of England a century earlier. The production figures for English pennies can then be taken as comparable for Venetian torneselli and 37,000 coins per obverse die is a reasonable approximation.

For the 29 obverse dies calculated for the Morosini issue of 1382, this would imply a total output of 1,073,000 coins. Morosini's reign was only four months long; the annual minting rate to be calculated for this period would be 3,219,000 torneselli. From Figure 7 (p. 46) it can be noted that the annual minting rate under Morosini was about 60 percent that under Venier, yielding an estimated 5,365,000 coins per year during the heavy minting under Venier. Under Contarini in the previous decade the rate was about half that of Morosini (34 index compared to 60), resulting in an estimated annual minting of about 1,820,000 torneselli in this reign.

The 1375 document discussed above led to a calculation of 5,840,000 torneselli minted in the middle of the reign of Contarini. The estimate of 1,820,000 per year derived from the die study is considerably less. It may be recalled that the 1375 figure was derived from a complaint of some minters that the production of torneselli had increased by a factor of ten. The total increase in annual production between 1361 and 1382 derived from hoard figures is less than fourfold, suggesting that the figure the minters gave as their workload, and hence the minting estimate derived

from it, was exaggerated. For the year 1386, in the reign of Venier, an official document implied an annual minting of 4,160,000 torneselli (above, p. 45), while the calculated average for his reign is about 5,365,000, remarkably close considering the imprecision and approximation involved in all the data and calculations.

For the 284 coins of Tomaso Mocenigo in the Chalkis Hoard, a die study of the reverses resulted in the identification of only 17 die pairs. Because of poor striking, in many pairings the same features could not be compared on both coins, with a resultant potential underestimation of the actual amount of die duplication. Using the figure of 267 reverse dies out of 284 coins and the procedures discussed above, one can calculate about 3,000 reverse dies for the issue. Taking 17,000 coins as the average output of a reverse die yields a total of almost 51,000,000 torneselli for the nine-year reign or an annual rate of 5,500,000 coins. Calculating the minting rate for the same reign by extrapolation from the figures of annual indices in Figure 7 (p. 46) and the die study of Morosini, one gets an estimate of 1,180,000 coins per year under Mocenigo in the early fifteenth century. The discrepancy between this figure and the much larger one based on a direct die study of Mocenigo reverses suggests that in the latter study die pairs were overlooked due to poor striking, resulting in an inflated calculation of the number of original dies.

From these considerations of numismatic and documentary evidence, it appears that the rate of minting of torneselli was about two million coins per year in the reign of Andrea Contarini (1368–82), rose to almost five and a half million under Antonio Venier (1382–1400), and dropped again to about one million a year by the reign of Tomaso Mocenigo (1414–23). If the mint operated about 250 days per year, this would be a maximum rate of about 21,500 coins per day from the tornesello workshop.



## ACCOUNTING SYSTEMS BASED ON THE TORNESELLO

Medieval documents seldom express quantities of money directly in terms of actual coins; they usually give such sums in moneys of account. Payments made in torneselli are noted variously, depending on the circumstances of the recording of the transaction. In documents written in Venice itself, such sums are usually expressed according to the accounting systems of Venice, even for payments specified to be made in the Greek colonies with tornesello coins. Most documents originating in Crete and the other colonies express sums of money in terms of local systems of reckoning.

By the fourteenth century Venice had several systems for accounting money; the system employed on a given occasion depended on the nature of the transaction and the type of document recording it.<sup>97</sup> The basic, and oldest, Venetian accounting system was the *lira di piccoli*, based like other post-Carolingian European systems on a silver penny with accounting multiples of a soldo (shilling) of 12 pennies and a lira (pound) of 240. At the beginning of the thirteenth century the larger, fine-silver grosso came to serve as the basis for a second, independent accounting system, the *lira di grossi*, in which 12 grossi made a soldo di grossi and 240 grossi a lira di grossi. The relationship between these two pounds of account varied over time. The gold ducat was introduced in the late thirteenth century and by the mid-fourteenth century had acquired a standard value of 24 grossi, that is ten ducats to the lira di grossi. The relationship of the gold coinage to the lira di piccoli system was expressed in the number of soldi di piccoli to the ducat, and this index changed continuously.

<sup>97</sup> For medieval accounting systems of Venice see Papadopoli (above, n. 2), 1, esp. pp. 120–36; and F. C. Lane, "The First Infidelities of the Venetian Lire," in H. Miskimin et al., eds., *The Medieval City* (New Haven, 1977), pp. 43–63.

In Crete, a Venetian colony since the beginning of the thirteenth century, accounting was basically in terms of Venetian coins. However, the largest unit, rather than being a European pound of 240 units, was the hyperperon, based on the Byzantine coin of that name which had circulated there in the eleventh and twelfth centuries.<sup>98</sup> The relationships within the Cretan system can be inferred from a letter written by a merchant in Candia in 1346, which gives the following figures.<sup>99</sup>

Sum:	7 hyperpera	4 grossi	7 piccoli
Deduction:	<u>2 hyperpera</u>	<u>10 grossi</u>	<u>10 piccoli</u>
Balance:	4 hyperpera	5 grossi	29 piccoli

This calculation works only if the grosso is counted as 32 piccoli and the hyperperon as 12 grossi.<sup>100</sup> Other documents from Crete from this period confirm these ratios. There were then 384 piccoli to the hyperperon of account on Crete. The grosso in this system appears to have been an abstract accounting system for 32 piccoli rather than the coin, as the actual silver grosso coin minted in Venice had a value of about 48 piccoli in this period.<sup>101</sup> Nor does the actual grosso coin appear to have circulated in Greece after the beginning of the fourteenth century.<sup>102</sup>

The 384 piccoli in the hyperperon of Crete could also be divided into 32 soldi di piccoli of 12 piccoli each. This would be especially convenient for accounting sums based on the soldino coin, which was worth one soldo di piccoli. The equivalence of 32 soldi to the hyperperon of Crete is demonstrated in a document produced in Candia in which a purchase of 45 pounds of a commodity selling at 6 soldi per pound (a total of 270 soldi) was recorded as 8 hyperpera 5 grossi 8 piccoli.<sup>103</sup> The value of the

<sup>98</sup> M. F. Hendy, *Coinage and Money in the Byzantine Empire, 1081–1261*, Dumbarton Oaks Studies 12 (Washington, 1969), pp. 14–25.

<sup>99</sup> Morozzo della Rocca (above, n. 17), p. 51, 22.

<sup>100</sup> 29 plus 10 piccoli would give 1 grosso of 32 piccoli and a remainder of 7. This grosso carried over and added to 5 plus 10 grossi would give 1 hyperperon of 12 grossi and a remainder of 4 grossi. The hyperperon carried over added to 4 plus 2 hyperpera would give the original 7 hyperpera.

<sup>101</sup> Papadopoli (above, n. 2), 1, p. 382; Lane (above, n. 97), pp. 59–61.

<sup>102</sup> For a survey of finds of grossi, see Metcalf (above, n. 1), p. 221.

<sup>103</sup> ADC, Notaio di Candia, Antonio di Brixiano, B. 11, f. 493v, 2 (19 Sept. 1375).

tornesello in this system after 1353 as three piccoli or one-fourth of a soldo can be inferred from the documents authorizing its minting and circulation in Crete, and from the merchant's manual of Uzzano, compiled in the fifteenth century.<sup>104</sup>

Venetian merchants had a settlement in Negroponte on the island of Euboea through the thirteenth century; in the course of the fourteenth century Venice extended its political control to an increasingly large part of the island.<sup>105</sup> The merchant's manual of Pegolotti, compiled in the early fourteenth century, defines the hyperperon of Negroponte as 25 sterlini.<sup>106</sup> A Venetian list of indemnities of 1321 gives the hyper-

<sup>104</sup> Appendix 2, 1 and 2, below. Giovanni di Antonio da Uzzano, *La pratica della mercatura*, vol. 4 of G. F. Pagnini della Ventura, *Della decima e di varie altre gravzze imposte dal Comune di Firenze* (Lisbon and Lucca, 1766; rpt. Bologna, 1967), p. 106: "Candia vi correno ducati Veneziani. Evvi una moneta che si chiamano perperi, e a questa moneta si fa mercato d'ogni cosa, e 4 perperi fanno uno ducato, e soldi 30 in 32 sono uno perpero, e 4 tornesi sono un soldo di quella moneta." That this reflects early fifteenth century conditions can be seen from the equivalence of four hyperpera to the ducat, as will be demonstrated below, pp. 61-66. In this passage, Uzzano reports that the hyperperon of Crete is worth from 30 to 32 soldi, an uncertainty which is not found in documents emanating from Crete itself. Another merchant's manual of the mid-fifteenth century, attributed to Chiarini, is correct in reporting 32 soldi to the hyperperon of Crete, but incorrect in saying that three torneselli equal the soldo: F. Borlandi, ed. *El libro di mercatantie e usenze de' paeisi*, Documenti e studi per la storia del commercio italiano 7 (Turin, 1936), pp. 32 and 145.

<sup>105</sup> Miller (above, n. 64), pp. 319-20.

<sup>106</sup> Pegolotti (above, n. 11), p. 149: "Perpero 1 di Negroponte si ragiona 25 sterlini [e] in mercatantia soldi 20 a grossi di Vinegia, di denari 26 a grossi 1 grosso di Vinegia." This indicates two ways of accounting the hyperperon of Negroponte: as 25 sterlings in the local system or as 20 soldi a grossi in Venetian accounting. The soldo a grosso was part of the lira a grosso system of Venice, in which the piccolo a grosso was defined as 1/26 of a grosso; see Lane (above, n. 97), p. 48. A hyperperon worth 20 soldi a grosso would be 20 times 12 or 240 denari a grossi; divided by 26 it would be about 9 1/4 grossi. With the grosso worth 32 piccoli of Venice, the hyperperon of Negroponte would be worth 9 1/4 times 32 or 296 piccoli. This would be 24 8/12 soldi di piccoli. So the sterling (25 to the hyperperon) would appear to be about the same as the soldo di piccoli (24 8/12 to the hyperperon). Elsewhere (p. 119), Pegolotti gives the figures of 23 1/2 sterlings and 12 grossi to the hyperperon of Negroponte, presumably at a local equivalence of 8 tournois to the grosso; see n. 108 below.

peron of Negroponte as 25 manus.<sup>107</sup> The arithmetic and merchant's guide known as the *Zibaldone da Canal*, also from the early fourteenth century, defines the Negroponte hyperperon as worth 12 Venetian grossi of 8 tournois each, that is 96 tournois.<sup>108</sup> Documents of the fifteenth century give the hyperperon of Negroponte as equivalent to 25 soldi.<sup>109</sup> The hyperperon in Negroponte appears originally to have been worth 25 sterlini or manus; by the fifteenth century 25 soldi was the standard figure. The soldo at the base of this system was originally based on the Venetian piccolo and soldino coins (12 piccoli or 1 soldino to the soldo), and in the later fourteenth century on the tornesello (4 torneselli to the soldo). The hyperperon of Negroponte, worth 25 soldi of torneselli, was then different from that used for accounting in Crete, where the hyperperon contained 32 soldi of torneselli.

Another island which came under Venice's political sway in the fourteenth century was Corfu. An act of the Venetian Senate of 1417 specified that a given sum of hyperpera not be counted in the hyperpera of Corfu, "worth 30 soldi each," but in those of Patras, "worth 20 soldi."<sup>110</sup> An entry in an account book of Venetian merchants on Corfu gives a sum which amounts to 4,013 hyperpera plus 162 1/2 soldi as 4,018 hyperpera plus 12 1/2 soldi, confirming the rate of 30 soldi to the hyperperon of Corfu.<sup>111</sup>

<sup>107</sup> ASV, Liber Commemoriali, 2, f. 105 (1321); publ. in G. Thomas, ed., *Diplomatium Veneto-Levantinum*, Monumenti storici, ser. 1, 5 (Venice, 1880), 1, p. 184, 88: "Nigroponte, ypperp. . . . ad manus XXV."

<sup>108</sup> A. Stussi (above, n. 23), p. 54: "In Negreponte se spende perperi e lo perpero val grossi XII de Venexia e lo grosso val tornexi 8, donca val lo perpero s. 8 de tornexi." Eight soldi of tournois would be 24 soldi of piccoli at the rate of 3 piccoli to the tournois.

<sup>109</sup> ASV, Liber Commemoriali 11, f. 49 (10 Apr. 1421); summ. in R. Predelli and P. Bosmin, eds., *I Libri Commemoriali della Repubblica di Venezia*, Monumenti storici, ser. 1, 8 (Venice, 1876-1914), 4, p. 33, 76. ADC, Ducali, B. 1, q. 14, f. 16 (22 June 1426); summ. in Thiriet, *Assemblées* (above, n. 8), 2, pp. 156-57, 1300.

<sup>110</sup> ASV, Senato, Misti 52, f. 13v (13 May 1417); publ. in Sathas (above, n. 56), 3, p. 156, 712, and summ. in Thiriet, *Sénat* (above, n. 55), 2, p. 154, 1650: "iperperis de Corphoi, que valent soldos XXX pro quolibet."

<sup>111</sup> ASV, Procuratori di San Marco, Atti, B. 10, fasc. 11 (account book of Alvise Giustiniano and Piero and Lorenzo Soranzo, 1440-43), f. 2v. I wish to thank Reinhold Mueller for calling my attention to this document.



Coron and Modon, twin castles in the Peloponnesus, became Venetian in the wake of the Fourth Crusade. The *Zibaldone da Canal* identifies the hyperperon of Coron with that of other parts of the Peloponnesus and defines it as 20 manus of deniers tournois or 6 soldi, 8 piccoli of tournois, that is 80 tournois coins.<sup>112</sup> The figure of 20 manus also appears in the list of indemnities of 1321, in which compensation made in Coron is specified as being in hyperpera “ad manus XX.”<sup>113</sup> As the soldo became the basic unit of accounting in Venetian colonies, the hyperperon of Coron and Modon became expressed as 20 soldi; it even appears in some documents as a lira.<sup>114</sup> The figure of 20 soldi to the hyperperon of Coron and Modon is confirmed by the account book of the Venetian merchant Badoer, working in Constantinople, in which a transaction of 1438 is recorded in one entry as 2 1/4 hyperpera of Modon and elsewhere as 45 soldi.<sup>115</sup>

Throughout the parts of Greece that remained independent of Venetian rule, the hyperperon was also the basic unit of account. For Clarentza and the rest of the Peloponnesus, Pegolotti defines the hyperperon as containing 20 sterlini of 4 deniers tournois each.<sup>116</sup> The same equiva-

<sup>112</sup> A. Stussi (above, n. 23), p. 58: “A Clarentza e a Choron e per tuta la Morea se fa li pagamenti a yppr., e mane XX de tornexi se conta ippr. I, ch’è s. VI, dir. VIII de tornexi.” Pegolotti’s manual (above, n. 11), p. 153, gives the hyperperon of Coron and Modon as 24 sterlings, or 12 Venetian grossi. Neither sum agrees with figures from other sources; it appears that the Florentine writer was misinterpreting his sources on these Venetian colonies, perhaps confusing them with Negroponte.

<sup>113</sup> See above, n. 107.

<sup>114</sup> ASV, Senato, Misti 52, f. 68 (18 Jan. 141[8]); summ. in Noiret (above, n. 59), p. 263, and in Thiriet, *Sénat* (above, n. 55), 2, p. 162, 1682. Statutes of Coron and Modon, f. 39 (31 July 1386); publ. in Sathas (above, n. 56), 4, pp. 71–72: “tornesi a XX soldi la libra como corre qua li tornesi.”

<sup>115</sup> U. Dorini and T. Bertelè, eds., *Il libro dei conti di Giacomo Badoer*, Il nuovo Ramusio 3 (Rome, 1956), pp. 239 and 388.

<sup>116</sup> Pegolotti (above, n. 11), pp. 116–17: “In Chiarenza e per tutta la Morea vanno a perpero sterlini 20, e gli sterlini non vi vendono nè vi si veggiono, ma ispendonvisi torneselli piccioli . . . e ogni denari 4 de’ detti tornesi piccioli si contano per 1 sterlino, e li 3 sterlini 1 grosso viniziano d’ariento di zecca di Vinegia, e li 7 grossi 1 piperio.” Here it is clear that the sterling is not an actual coin, but an accounting unit for 4 tournois coins; the grosso discussed here is specified as being an actual coin. Seven grossi worth 3 sterlings each would make a hyperperon of 21 rather than 20 sterlings, another example of Pegolotti’s imprecision.

lence is given in a document of 1337.<sup>117</sup> Here the sterlino is clearly equal to the manus of 4 tournois. The figure of 20 soldi per hyperperon appears in documents of the fifteenth century relating to the mainland towns of Lepanto and Patras, which had recently come under Venetian rule.<sup>118</sup>

Figure 9 summarizes these deductions about the moneys of account in Greece in the period of the tornesello. The base of the systems, the piccolo, is rarely found in Greek hoards or excavations and seems to be primarily an accounting unit, though a proclamation of 1369 from Crete notes the arrival there of a shipment of piccoli and insists on their circulation at full value.<sup>119</sup> The principal circulating coin after the middle of the fourteenth century was the tornesello, minted in Venice and shipped to the colonies; it was accounted as three piccoli or one-fourth of a soldo. The soldo was represented for a time by the silver soldino coin, but this disappeared from circulation in the latter part of the fourteenth century. From then on the soldo was the accounting term for four torne-selli, replacing the term manus, which was equivalent. Sterlino was an accounting term derived from the English sterling penny, which had apparently circulated in Greece in the thirteenth century; in most sources it appears to have been the same as the soldo or manus, i.e. four tournois. The grosso as it appears in most documents of late medieval Crete is an accounting term equal to 32 pennies, that is  $10 \frac{2}{3}$  tornesello coins; when

<sup>117</sup> Florence, Archivio Ricassoli, fonds Accaiuoli 136 (10 May 1337), publ. in Longnon and Topping (above, n. 9), pp. 31–53, 2: “ad rationem de sterlingis viginti pro yperpero et tornensibus quatuor pro quolibet ipsorum sterlingorum ad yperpera Claren-cie.” The anonymous *Tarifa* (above, n. 24), p. 40, states that “In Clarenza se spende tornexi, e le 20 man de tornexi val grossi 10 veneziani.” This rate of 8 tournois to the grosso of Venice is found for Negroponte as well (see n. 106, above); the 12 tournois of Pegolotti may reflect an earlier rate or an error.

<sup>118</sup> Lepanto: ASV, Senato, Misti 51, f. 131 (14 May 1416); publ. in Sathas (above, n. 56), 3, pp. 136–37, 690: “ad rationem soldorum XX tornexiorum pro iperperum.” Patras: ASV, Senato, Misti 52, f. 13v (13 May 1417), see n. 110 above: “iperperis . . . de Patrasio que valent soldos XX.”

<sup>119</sup> ADC, Proclami, B. 14bis, f. 178r and v, 106 (10 Sept. 1369): “Quod cum domi-nacio conduci fecerit de Veneciis certam quantitatem denariorum parvorum pro bono et comodo hominum huius terre, dominus ducha et eius consilium volentes quod dicti denarii parvi currant et expendantur ad rationem denariorum trium pro quolibet tornesello et ad rationem denariorum duodecim pro quolibet soldino et ad ratio-nem denariorum sexdecim pro quolibet mezzanino.”

reference is to an actual coin, documents specify "grosso d'argento" or "grosso di zecca."

The largest accounting unit for all of the systems of the region was the hyperperon, bearing the name of a Byzantine coin, but actually defined in terms of the Venetian tornesello. In Crete the hyperperon contained 32 soldi or 128 torneselli; in Corfu it was 30 soldi; in Negroponte, 25 soldi; and throughout the mainland of Greece, including the small Venetian territories there, it was defined as 20 soldi. The accounting systems of these places were then different, but all were based on the same actual coin, the tornesello. Their relationship could be expressed in terms of the soldo of 4 torneselli, which was constant throughout the region.

### FIGURE 9

#### Coins and Accounting Units in Greece after 1350

##### *Circulating Coins*

Tornesello — billon coin, 11% silver, 89% copper, .55–.65 g.

Soldino — silver coin, 95% silver, 5% copper, .46–.55 g (decreasing circulation in second half of fourteenth century).

Ducat — gold coin, 100% gold, c. 3.56 g.

##### *Moneys of Account*

Piccolo (denarius, parvus, penny) — basic unit of coinage of Venice.

Tornesello (turonensis) = 3 piccoli.

Soldo (solidus, formerly sterlino or manus) = 4 torneselli = 12 piccoli.

Grosso (originally a Venetian coin, no longer circulating in Greece) = 32 piccoli.

Hyperperon (perpero, originally a Byzantine coin, no longer circulating in Greece) —

Crete: 1 hyperperon = 32 soldi = 12 grossi = 128 torneselli.

Corfu: 1 hyperperon = 30 soldi = 120 torneselli.

Negroponte: 1 hyperperon = 25 soldi = 100 torneselli.

Mainland (including Coron and Modon): 1 hyperperon = 20 soldi = 80 torneselli.



## THE VALUE OF THE TORNESELLO

As the soldo was a common unit of value throughout Greece and the islands in the later Middle Ages, quotations of the rate of the Venetian gold ducat to any of the local systems based on the tornesello were usually expressed in the number of soldi to the ducat. From a survey of documents after the introduction of the tornesello in 1353, it is possible to chart the rate for the number of soldi to the constant ducat and hence to follow the changing value of the tornesello.

Not all quotations of soldi to the ducat encountered in documents give usable data for the value of the tornesello. The relation of the ducat to the silver-based lira di piccoli in Venice was also quoted in terms of the number of soldi to the ducat; it is not always apparent whether a given quotation refers to the soldo of Venice, based on silver, or that of Greece, based on the tornesello. An account book kept in Corfu between 1440 and 1443 is reckoned in the hyperperon of Corfu of 30 soldi each, but gives quotations in "soldi d'ariento" of between 110 and 114 soldi to the ducat, which corresponds to the rate of the Venetian soldo di piccoli of the period rather than to that based on the tornesello, which was then between 150 and 160 soldi to the ducat.<sup>120</sup> Documents relating to Greece from the late fifteenth century sometimes give a rate of 124 soldi to the ducat, which was a standard value for the soldo of Venice for the period but much lower than the rate for the tornesello.<sup>121</sup>

Another source of potential confusion is the fact that at the beginning of the fifteenth century an official rate of 96 soldi per ducat was established for calculating the pay of Venetian employees in Greece. This figure appears in official decrees through the century and occasioned numerous appeals by officials who wished their salaries calculated at the

<sup>120</sup> See above, n. 111.

<sup>121</sup> E.g. ASV, Senato, Segrete 22, f. 5 (17 Mar. 1464); publ. in Sathas (above, n. 56), 1, pp. 239–42, 161.

actual, effective rate.<sup>122</sup> Such appeals were routinely rejected by the Venetian Senate, but in some cases salaries were raised to compensate for the low exchange rate.<sup>123</sup>

Some exchange rates appear to conceal an interest charge and cannot be used unless the amount of interest is known. A transaction of 1375 recorded by a notary in Crete relates the receipt of 500 ducats by letter of exchange from Venice, with repayment due three months later.<sup>124</sup> The rate at which the ducats were converted into hyperpera of Crete is 74 soldi to the ducat; they were to be repaid at 67 soldi to the ducat, indicating an interest charge of about 10 percent for this transaction. Another entry from that year in the same register records a conversion, not involving interest, at the rate of 73 soldi to the ducat.<sup>125</sup>

Figure 10 presents a comparison between the rate for the ducat in soldi of Venice with the rate throughout Greece, based on the soldo of four torneselli each.<sup>126</sup> It is evident from the graph that there can be no single value of the soldo of Greece for a given year. While exchanges in Venice were transacted at the Rialto by money changers abreast of current rates, throughout the Greek territories transactions were made at many places where the flow of information was poor and local conditions varied. There appears to have been an effective rate for the tornesello in Venice beyond the official rate of 96 soldi to the ducat; a letter of 1425 from the doge to the governor of Crete notes that a sum was calculated according to the rate of 4 hyperpera, 12 soldi per ducat (i.e. 140 soldi) and so recorded in the records of the Republic.<sup>127</sup> In the fifteenth century, officials of provincial centers in Crete wrote to the gov-

<sup>122</sup> E.g. ASV, Senato, Misti 46, f. 136v. (3 June 1404); (see above, n. 63). ASV, Cancelleria Segreta, Comm. Rettori, B. 2, 52 (10 May 1485); publ. in Sathas (above, n. 56), 1, pp. 283–306, 198.

<sup>123</sup> E.g. ASV, Senato, Misti 57, f. 84 (10 Mar. 1429), publ. in Sathas (above, n. 56), 3, p. 348, 933.

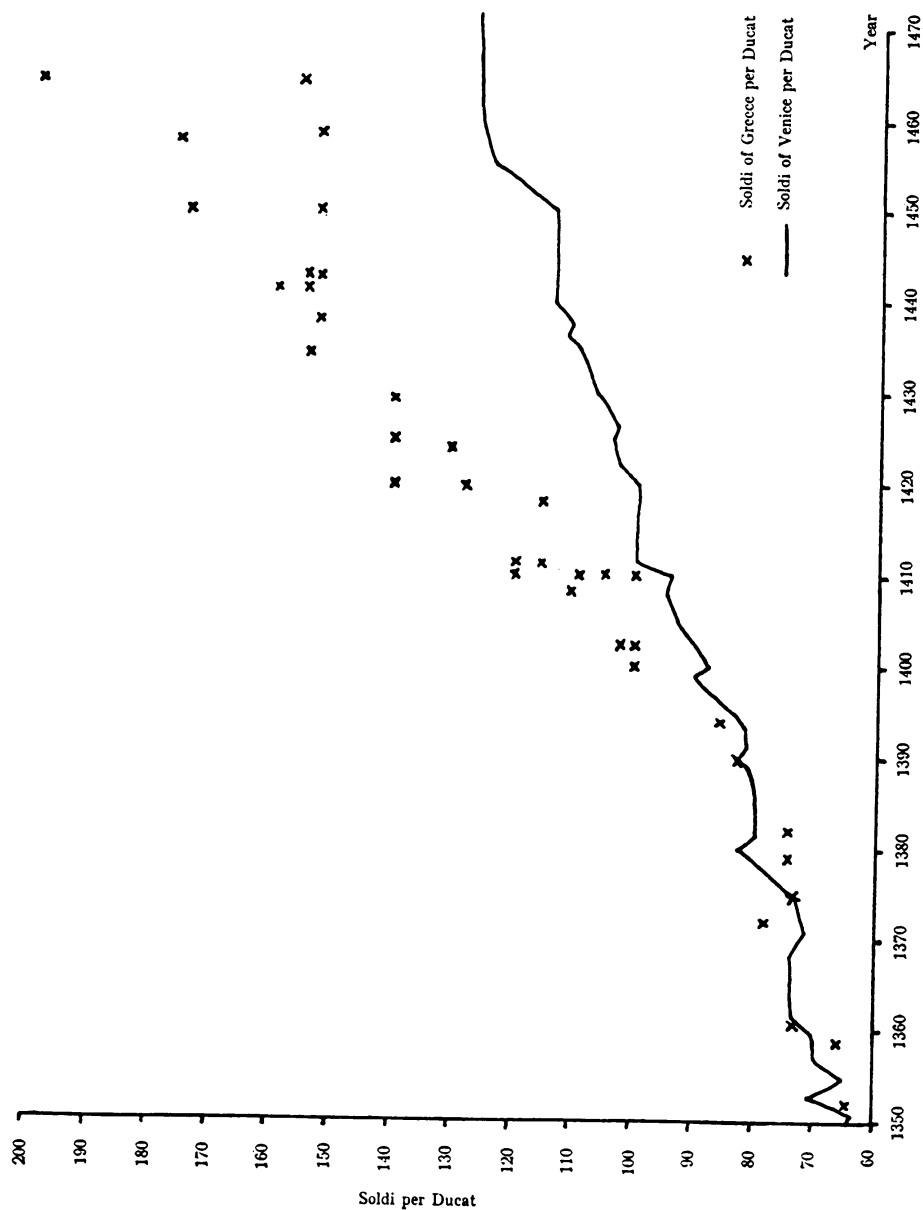
<sup>124</sup> ASV, Notaio di Candia, Antonio di Brixiano, B. 11, f. 506, 9 (16 Nov. 1375).

<sup>125</sup> Above, n. 124, B. 11, f. 479v, 10 (21 May 1375).

<sup>126</sup> Documentation for Figure 10 is given in Appendix 3, below.

<sup>127</sup> ADC, Ducali, B. 1, q. 11, f. 34v–35 (7 Feb. 142[5]); summ. in Thiriet, *Assemblées* (above, n. 8), 2, p. 152, 1425 (with rate given incorrectly as 4 hyperpera 4 soldi): “illi ducati 898 valebant secundum comunem cursum ad rationem perperorum IIII s XII pro ducato et sic in libris communis apparet.”

FIGURE 10  
Soldi per Ducat in Venice and Greece



ernor in Candia inquiring about the current exchange rate; one reported having collected money according to the local rate, as gold was rare in his town and the rate was high.<sup>128</sup>

An illustration of the variety of rates recorded for a single year can be seen in several documents of 1410. A proclamation states that the monthly pension of a colonial official must be paid at the rate of 96 soldi to the ducat.<sup>129</sup> Two transactions with shipboard merchants convert purchases at the rate of 5 pounds to the ducat.<sup>130</sup> A letter written in Crete in 1410 reiterates transactions of 1406 and gives a rate of 105 soldi per ducat without specifying for which year this rate applied.<sup>131</sup> Another letter of the same year refers to transactions of 1395 and gives an exchange rate of 107 soldi to the ducat.<sup>132</sup> A letter from the Venetian consul in Alexandria to the governor of Crete gives various sums in "bezants" of Alexandria and converts them into ducats and into hyperpera of Crete at a rate specified as 109 soldi per ducat.<sup>133</sup> Finally, an official of Negroponte complains that while his salary is paid at the official rate of 96 soldi per ducat, the current effective rate is 120.<sup>134</sup> In Figure 10, quotations for the year 1410 are marked at 100 for the shipboard purchases, 105 and 107 for the earlier transactions apparently reported in terms of present rates, 109 for the Alexandria figure, and 120 for the complaint, which is probably exaggerated but cannot be ignored. The official rate of 96, while not much below other quotations, was probably not effective and is not charted.

Even with the dispersal of rates for a given year, a trend is evident in Figure 10. From 1353 to 1400, the number of soldi per ducat in Greece rose at about the same rate as that of the soldo of Venice; in fact it

<sup>128</sup> ADC, Ducali, B. 1, q. 6, f. 12v (10 Dec. 1410). ADC, Ducali, B. 2, q. 18, f. 23v [marked 22] (11 Feb. 144[2]); publ. in Thiriet, *Assemblées* (above, n. 8), 2, pp. 320–21, 1382.

<sup>129</sup> ADC, Ducali, B. 1, q. 5, f. 41r and v (2 Sept. 1410); summ. in Thiriet, *Assemblées* (above, n. 8), 2, p. 126, 1160.

<sup>130</sup> ADC, Ducali, B. 1, q. 6, f. 28–29v (23 Jan. 14[10]). ADC, Ducali, B. 1, q. 6, f. 30–33v (ca. 1 July 1410).

<sup>131</sup> ADC, Ducali, B. 1, q. 6, f. 17v (5 Sept. 1410).

<sup>132</sup> ADC, Ducali, B. 1, q. 6, f. 36r and v (15 July 1410).

<sup>133</sup> ADC, Ducali, B. 1, q. 6, f. 46v (27 Aug. 1410).

<sup>134</sup> See above, n. 58.



seems to have been a bit below the Venetian rate. Beginning about 1400, the number of soldi of torneselli needed to buy a ducat rose sharply, at a significantly higher rate than the Venetian soldo. In 1444, the Venetian Senate recognized that 4 lire of torneselli were worth 3 lire of "good" silver currency, i.e. Venetian soldini.<sup>135</sup> In 1464 the Senate set a new official exchange for Crete of 6 torneselli per soldino, a devaluation of 50 percent from the 4 torneselli per soldino set a century earlier.<sup>136</sup>

As with many other aspects of life, prices in the Venetian colonies were regulated by the state, resulting in data which permit a brief survey of the buying power of the tornesello. In 1366 a loaf of bread weighing 9 1/2 local ounces (.34 kg) was to sell in Crete for 2 torneselli.<sup>137</sup> Four years later the loaf selling for 2 torneselli had to contain 14 ounces, apparently due to a lower price of grain; weights of this price loaf vary continually in later documents.<sup>138</sup> In the same period, meat was set at around 5 to 6 torneselli per pound.<sup>139</sup>

Salaries of Venetian colonial officials and employees are known chiefly from the early fifteenth century. In 1402 the workmen constructing a fortress on Corfu were to be paid from 4 to 5 soldi of torneselli (16 to 20 coins) per day.<sup>140</sup> For the repair of fortifications in Negroponte in 1452, master masons were to receive 12 soldi of torneselli per day, while laborers got 6 to 8 soldi.<sup>141</sup> In 1422 Doge Tomaso Mocenigo wrote to the

<sup>135</sup> ASV, Senato, Mar 2, f. 29v and ADC, Ducali, B. 2, q. 19, f. 43r and v (9 Sept. 1444); publ. in Noiret (above, n. 54), pp. 409–10, and summ. in Thiriet, *Sénat* (above, n. 55), 3, p. 118, 2666: "lire 4 de ternexi . . . che vigneria a esser de bona moneda darzento lire 3".

<sup>136</sup> ASV, Senato, Mar 7, f. 182 (27 July 1464); quoted in F. Thiriet, *La Romanie vénitienne au Moyen Âge*, Bibliothèque des Écoles Françaises d'Athènes et de Rome 193 (Paris, 1959), p. 412, n. 5: "Et camera Crete teneatur exigere et expendere suprascriptam argenti monetam hoc est soldum, ad rationem tornesiorum sex."

<sup>137</sup> ADC, Proclami, B. 14bis, f. 130, 14 (21 July 1366). The Cretan heavy pound was equal to 91 percent of the heavy pound of Venice of .47 kg, which was used for food commodities; it was divided into 12 ounces; see Pegolotti (above, n. 11), pp. 106 and 139, and Martini (above, n. 19), p. 818.

<sup>138</sup> ADC, Proclami, B. 14bis, f. 188v, 14 (27 Oct. 1370).

<sup>139</sup> ADC, Proclami, B. 14bis, f. 188, 13 (27 Oct. 1370).

<sup>140</sup> ASV, Senato, Misti 46, f. 23v (1 June 1402); publ. in Sathas (above, n. 56), 2, pp. 85–86, 304.

<sup>141</sup> ASV, Senato, Mar 4, f. 121v–122v (11 May 1452); summ. in Thiriet, *Sénat* (above, n. 55), 3, pp. 175–76, 2888.

governor of Crete that, because of the drop of the value of the tornesello, the salaries of seamen should be raised by 2 hyperpera per month to 10 hyperpera of Crete, that is 320 soldi or 1,280 torneselli per month.<sup>142</sup> In 1429 oarsmen were to get 12 hyperpera of Negroponte per month (300 soldi); other salaries for seamen ranged from 350 to 400 soldi.<sup>143</sup> For the defense of Modon in 1459, recruits were given 10 soldi of torneselli per day.<sup>144</sup>

From such figures it appears that by the middle of the fifteenth century a salary of 300 soldi of torneselli per month was about the standard pay for a sailor or soldier. The Chalkis Hoard as studied, with 4,806 coins, would have represented almost exactly 1,200 soldi and so would correspond to four months' salary of such an individual. This is certainly a sum worth secreting in the earth in the climate of uncertainty which must have prevailed in Greece in the late fifteenth century.

<sup>142</sup> ADC, Ducali, B. 1, q. 10, f. 9 (23 Dec. 1422).

<sup>143</sup> ASV, Senato, Misti 57, f. 81v-83v (10 Mar. 1429); publ. in Sathas (above, n. 56), 3, pp. 344-48, 932, and summ. in Thiriet, *Sénat* (above, n. 55), 2, 257, 2124.

<sup>144</sup> ASV, Senato, Mar 6, f. 148 (10 Dec. 1459); summ in Thiriet, *Sénat* (above, n. 55), 3, p. 228, 3092.

## COIN PRODUCTION AND INFLATION

From the investigations of the minting and the value of the tornesello, two quantitative observations emerge. First, there was an enormous increase in the production of torneselli in the last quarter of the fourteenth century and, second, there was a significant decline in the value of the coin in succeeding decades, as measured against both the silver soldino and the gold ducat. It is worthwhile to investigate here the causes of these phenomena and any relationship between them.

Venice's commercial interests in Greece and the Greek islands gave way to actual governance as a result of the division of the Byzantine Empire following the Fourth Crusade of 1202.<sup>145</sup> For the next century and a half, Venice competed for dominance in the region with various barons of European origin who established principalities there and with Genoa, which was also building a colonial empire in the region. By the middle of the fourteenth century, most of the dynasties of Franks, Catalans and Italians had lost power and had ceased minting their own coins in Greece. It was at this time that Venice stepped in with the tornesello, intended specifically for this region. The Venetian rivalry with Genoa culminated in the War of Chioggia; the Peace of Turin which ended it in 1381 involved some losses to Venice, but offered it a decided advantage in Greece.<sup>146</sup> It was in this period that Venice appears to have stopped sending silver soldini to its colonies and to have greatly increased the production of torneselli. The importance of the Greek colonies to Venice at this time is exemplified by the fact that Antonio Venier was governor of Crete at the time of his election as doge in 1382.

It cannot be denied that by producing the tornesello for its colonies, and indirectly for all of Greece, Venice was filling a genuine need. With no operating mints and little coinage coming from other Italian cities,

<sup>145</sup> Thiriet, *Romanie* (above, n. 136), pp. 63–104.

<sup>146</sup> Thiriet, *Romanie* (above, n. 136), p. 178.

Greece would have had a need for petty coinage. The profit to be made from such a production is also undeniable. If the tornesello was minted at the standards prescribed in the 1353 authorization, it was highly overvalued.<sup>147</sup> If it was issued at a lower weight standard than this, as inferred above, pp. 38-39, the overvaluation was even higher. A document of 1386 noted that for a quantity of torneselli with a market value of 13,000 ducats, the government received a profit of 4,000 ducats, representing an added value of 44 percent over the intrinsic value.<sup>148</sup> The profit to be made by Venice by switching the colonies from the soldino to the tornesello was substantial. Its position after the Peace of Turin gave Venice almost a monetary monopoly over the independent parts of Greece as well as over its own colonies. Its increasingly large civil service could be required to take its pay in torneselli while other people would use the coins for lack of alternatives. As the fifteenth century progressed, increasing numbers of soldiers were brought in by Venice to battle the advancing Turks; these soldiers could also be paid in torneselli.

The fall in the value of the soldo of Venice in relation to the ducat paralleled a constant decrease in the amount of silver in the soldino; the gold ducat remained physically unchanged.<sup>149</sup> There is no documentary evidence for a similar loss in intrinsic value of the tornesello. The alloy of 11 percent silver appears to have been maintained, as demonstrated above, pp. 41-43. The weight decline discussed there is at most 15 percent (from .69 to .60 g) for the period 1353 to 1423. This is not sufficient to cause a loss of almost half the value of the coin, from 264 torneselli to the ducat in 1359 to 520 in 1424. After 1423 virtually no torneselli were added to the circulation in Greece, so no change in standard could account for its continued drop to 792 to the ducat in 1466.

The Venetians claimed that the drop in the value of the tornesello resulted from an influx of imitations which they said came from the mainland of Greece and from lands under Turkish rule. In 1435 the Venetian Senate authorized the governor of Negroponte and his council

<sup>147</sup> See above, pp. 12-13.

<sup>148</sup> See Appendix 4, 8, below.

<sup>149</sup> Papadopoli (above, n. 2), p. 181 and p. 289.

to take whatever action he could against these imitations.<sup>150</sup> In 1462, among many other complaints, Venetians in Crete stated that not only merchants but also taxes suffered from the high rate of the ducat caused by the circulation of so many false torneselli.<sup>151</sup> They proposed a “purificatio tornesium,” presumably a systematic checking for imitations, and a legal stabilization of the rate of the ducat for three years. The Senate agreed only to a ban on torneselli coming from abroad, and two years later officially devalued the tornesello.<sup>152</sup>

The Venetian explanation of imitations causing most of the decline of the tornesello is not satisfactory. Most of the imitations in the hoards examined bear the name of Antonio Venier, who ceased to rule in 1400. While it is not certain that such imitations were coined during his reign, a counterfeiter would no doubt find it easier to introduce new coins into circulation if they bore the name of a recent doge, rather than one from several decades earlier. The imitations in the Chalkis Hoard do not reach 3 percent of the total. Even if allowance is made for a certain number that may not have been recognized as imitations, it is inconceivable that the number of false torneselli in circulation was high enough to effect an extreme loss in the value of the coinage as a whole. Complaints about the influx of imitation torneselli come from 1435 and 1462, by which time the value of the soldo of Greece based on the tornesello had already dropped well below that of the soldo of Venice, as can be seen in Figure 10, p. 63.

The most likely cause for the decline in value of the tornesello is the very number of them put into circulation. Venice was able to induce the circulation of the overvalued coin through a combination of the need for petty coinage in Greece, the possibility of conversion into the relatively strong soldino, and the requirement that civil and military employees receive their pay in the coinage dictated by Venice. By the end of the reign of Antonio Venier in 1400 there could have been no shortage of petty coinage; even on the Greek mainland beyond Venice's rule, the tornesello bearing his name is by far the most commonly found coin of the later Middle Ages. By the same period, the silver soldino had ceased

<sup>150</sup> See Appendix 4, 10, below.

<sup>151</sup> See Appendix 4, 11, below.

<sup>152</sup> See above, n. 136.

to circulate in Greece, the rate for the soldo of torneselli had separated from that based on the soldino, and convertibility was no longer automatic. While Venetian employees were still paid at an artificially low exchange rate for the tornesello, they demanded and often received raises in their salaries to compensate for payment in torneselli. The Venetians themselves appear to have recognized the relationship between their large minting of torneselli in the late fourteenth century and the loss in value of the coin. Production of torneselli was curtailed considerably after 1400 and came to a near halt by 1423.<sup>153</sup>

In the early decades of the fifteenth century, Venice turned its attention away from its Aegean colonies, increasingly threatened by Turkish advances, and towards the Italian mainland. In developing its new colonies of Verona, Vicenza, Padua and Brescia it introduced many policies and institutions which it had developed for Crete and other Greek colonies. The example of the tornesello was followed by the bagattino, a highly overvalued coin which Venice produced in large quantities in the mid-fifteenth century for its colonies of Terraferma.<sup>154</sup> Like the tornesello, it subsequently fell in value and contributed to the disaffection of these colonies.<sup>155</sup>

In Greece the tornesello continued to circulate, even in the lands under Turkish rule. In the Chalkis Hoard, buried after 1462, after most of the Greek mainland had fallen to the Turks, 92 percent of the coins were Venetian torneselli minted more than 50 years earlier. Under Venetian dominance the coinage of Greece had declined from the Byzantine system of gold, silver and bronze denominations to one based on a single small billon coin, a situation reminiscent of that in Latin Europe in the centuries before the beginning of the commercial revolution of the later Middle Ages.

<sup>153</sup> By 1486, after more than 60 years of curtailed minting, the quantity of torneselli in circulation was much reduced, and Venice authorized the minting of a new issue with reduced fineness and ordered the coins shipped to its remaining colonies in Greece: ASV, Consiglio dei Dieci, Misti 23, f. 70 (30 Dec. 1486); publ. in Papadopoli (above, n. 2), 2, pp. 605–6, 89, and Sathas (above, n. 56), 1, pp. 307–8, 200. Such torneselli of Doge Agostino Barbarigo (1486–1501) have been found on the mainland at Athens and Corinth, which had been under Turkish rule since mid-century, see Appendix 2, 2 and 4, below.

<sup>154</sup> Papadopoli (above, n. 2), 1, pp. 259–68.

<sup>155</sup> R. C. Mueller, "L'Imperialismo monetario veneziano nel quattrocento," *Società e Storia* 8 (1980), pp. 277–97.

## APPENDICES

### 1. THE CHALKIS HOARD

This parcel of 4,806 coins was lent to the American Numismatic Society on 15 November 1980 by John Aiello, an American dealer. The only information available on provenance was that the coins comprised the total contents of a hoard recently found in Greece. Through the kind arrangements of Mr. Aiello, a donation was made to the ANS of 59 representative torneselli, plus all 23 other coins from the hoard; all illustrated coins are in the ANS collection. The rest of the hoard was dispersed, chiefly through dealer Alex Malloy. In 1983, a parcel of 1,000 torneselli was given to the Numismatic Collection of the Smithsonian Institution, said to have come from the Chalkis Hoard; these coins were apparently among those examined in the original parcel and catalogued below.

In response to inquiries as to the origin of the hoard, Mr. Aiello recalled that his informant had mentioned the name of Arta, capital of medieval Epirus and a reasonable site for the deposition of a hoard in the 1460s or 1470s. In a few earlier notes on this find, it has been referred to as the Arta Hoard of Venetian torneselli. Subsequently, however, Anastasios P. Tzamalīs of Athens has supplied the information that this hoard was actually found in the Chalkis area of Negroponte. This provenance is also reasonable from a historical viewpoint, as Negroponte fell to the Turks in 1470, around the closing date of the hoard. I thank Mr. Tzamalīs for his diligent detective work and have referred to this find as the Chalkis Hoard in this study, though Arta must still be considered a possible find spot.

Papadopoli references are to Nicolò Papadopoli, *Le Monete di Venezia* (Venice, 1893–1919), vol. 1; *CNI* references are to *Corpus Nummorum Italicorum* (Rome, 1910–70), vols. 1–20; Schlumberger references are to G. Schlumberger, *Numismatique de l'Orient Latin* (1878, reprint Graz, 1954); Seltman references are to A. J. Seltman, "Late Deniers Tournois

of Frankish Greece," in R. A. G. Carson, ed., *Mints, Dies and Currency: Essays Dedicated to the Memory of Albert Baldwin* (London, 1971); and Tzamalis references are to Anastasios P. Tzamalis, *Ta Nomismata tes Phraggochratias, 1184-1566* (Athens, 1981). Numbered entries are illustrated in the plates.

## ITALY: VENICE

## TORNESELLI

**Andrea Dandolo** (1343-54)

*Obv.* : ☩ : ΠΝΔΡ : ΔΤΝΔΥΛΟ : ΔΥΧ Cross pattée.

Legend var.: : ☩ : | • ☩ • | ☩ • | [first] Π | Π |

*Rev.* : ☩ ΥΧΙΛΙΦΕΡ : ΥΝΘΑΙΑΥ 𐌔 Winged lion with book, facing.

Legend var.: : ☩ | ☩ | ☩ : | : ☩ •

**4 coins**, mean .57 g (no die duplication).

Papadopoli, p. 183, 8; *CNI* 7, pp. 76-77, 57-59.

1. ↗ .60 g, 13.4% ± 2.7% silver.

**Marino Falier** (1354-55)

*Obv.* ☩ : ΜΑΡΙΝ<sup>3</sup>ΦΑΛΕΔΡΟ • ΔΥΧ Cross pattée.

*Rev.* ☩ ΥΧΙΛΙΦΕΡ : ΥΝΘΑΙΑΥ 𐌔 Winged lion with book, facing.

**1 coin.**

Papadopoli, p. 187, 4; *CNI* 7, p. 79, 22.

2. ↘ .60 g, 12.4 % ± 2.5% silver.

**Giovanni Gradenigo** (1355-56)

*Obv.* •☩• ΙΟ : ΓΡΑΔΟΙΔΟ • ΔΥΧ Cross pattée.

Legend var.: • ☩ • | ☩ | • ☩ : | Ο•Δ | Ο : Δ | Ο<sup>3</sup> : Δ | ΟΙΔΟ | Ο•ΙΔ<sup>3</sup>Ο

*Rev.* ☩ • ΥΧΙΛΙΦΕΡ : ΥΝΘΑΙΑΥ 𐌔 Winged lion with book, facing.

Legend var.: ☩ • | ☩ : | • ☩ : | Π | Π



**11 coins**, mean .61 g ( 1 die pair, no other links).  
Papadopoli, p. 192, 8; *CNI* 7, p. 82, 21–27.

3. ↙ .62 g, 11.7% ± 2.3% silver.

**Giovanni Dolfín** (1356–61)

*Obv.* ⚔• IO • DOLPHYNO • DVX Cross pattée.

Legend var.: ⚔ • | ⚔ | O•DV | O : DV

*Rev.* •⚔• VAXILIFER • VANDIT 24 Winged lion  
with book, facing.

Legend var.: • ⚔ • | •⚔ | ⚔ | R•V | R : V

**6 coins**, mean .62 g (no die duplication).  
Papadopoli, p. 197, 4; *CNI* 7, p. 86, 26–29.

4. ↗ .58 g, 12.4% ± 2.5% silver.

**Lorenzo Celsi** (1361–65)

*Obv.* •⚔• LAVR • CELSI • DVX Cross pattée.

Legend var.: •⚔• | ⚔ | ⚔• | π | π

*Rev.* • + VAXILIFER • VANDIT 24 Winged lion  
with book, facing.

Legend var. : • + | + • | + | 24 | π

**47 coins**, mean .61 g, σ (standard deviation) .04 g.  
Papadopoli, p. 201, 4; *CNI* 7, p. 90, 28–31.

5. ↑ .59 g, 6.0% ± 2.0% silver.

**Marco Corner** (1365–68)

*Obv.* •⚔• MARCORN • DVX Cross pattée.

Legend var.: •⚔• | •⚔ | ⚔• | π | π | αα | α'α |  
N•D | ND

*Rev.* +• VAXILIFER • VANDIT 24 Winged lion  
with book, facing.

Legend var.: +• | •+ | + | R•V | RV

**97 coins**, mean .63 g, σ .05 g.  
Papadopoli, p. 204, 5; *CNI* 7, p. 94, 20–23.

6. ↗ .70 g, 12.6% ± 2.5% silver.  
7. → .68 g, 11.7% ± 2.3% silver.

**Andrea Contarini (1368–82)**

*Obv.* •✠• ANDR<sup>o</sup> OTAR<sup>o</sup> DVX Cross pattée.

Legend var.: •✠• | •✠ | ✠• | ✠ | R<sup>o</sup> O | R<sup>o</sup> O |  
R<sup>o</sup> O | R O | O T | O T | R<sup>o</sup> D | R<sup>o</sup> D | R D

*Rev.* ✚ VEXILIFER • VENETIA 21 (43 coins) or  
✚ VEXILIFER • VENETIA 21 (746 coins).

Winged lion with book, facing.

Legend var.: ✚ | •✚• | ✚•

**789 coins**, mean .64 g,  $\sigma$  .06 g.

Papadopoli, p. 217, 7–8; *CNI* 7, pp. 101–2, 58–69.

- |     |   |                                 |
|-----|---|---------------------------------|
| 8.  | ↗ | .61 g, 12.1% $\pm$ 2.4% silver. |
| 9.  | ← | .60 g, 13.9% $\pm$ 2.8% silver. |
| 10. | ↘ | .64 g, 11.0% $\pm$ 2.2% silver. |
| 11. | ↖ | .59 g, 11.2% $\pm$ 2.2% silver. |

**Michele Morosini (1382)**

*Obv.* ✚ MICHL<sup>o</sup> MAVRO<sup>o</sup> DVX Cross pattée.

Legend var.: ✚ | •✚ | ✚• | L<sup>o</sup> M | L•M | O<sup>o</sup> D |  
O•D | OD |

*Rev.* ✚ VEXILIFER • VENETIA 21 Winged lion  
with book, facing.

Legend var.: ✚ | ✚• | R•V | RV

**26 coins**, mean .56 g, including 3 coins of same obv. and rev. dies; 3 die pairs; and 5 additional obv. die links. The linkage of 46 specimens of this issue, from various provenances, is diagrammed in Figure 8 (above, p. 48).

Papadopoli, p. 221, 4; *CNI* 7, p. 106, 18–19.

- |     |   |                                 |
|-----|---|---------------------------------|
| 12. | ↘ | .63 g, 9.6% $\pm$ 2.0% silver.  |
| 13. | ↓ | .64 g, 11.3% $\pm$ 2.2% silver. |

**Antonio Venier (1382–1400)**

*Obv.* •✠• ANTO<sup>o</sup> • VENARIO • DVX Cross pattée.

Legend var.: •✠• | •✠ | ✠• | ✠ | N | H | O<sup>o</sup> V |  
O<sup>o</sup> V

*Rev.* ✚ VEXILIFER • VENETIA 21 Winged lion  
with book, facing.

Legend var.: ✚ | •✚ | ✚• | •✚• | •✚• | N | H |  
R•V | RV

**2629 coins**, mean .58 g,  $\sigma$  .08 g.

Papadopoli, p. 231, 7; *CNI* 7, p. 112, 48–57.

14. ✓ .58 g, 11.8%  $\pm$  2.4% silver.  
 15. ✓ .54 g, 12.3%  $\pm$  2.5% silver.  
 16. → .59 g, 10.9%  $\pm$  2.2% silver.  
 17. → .73 g, 12.1%  $\pm$  2.4% silver. Also tested for composition using the method described in *Archaeometry* 10 (1967), pp. 78–86; method 3 of this procedure gave a silver value of 12.0%  $\pm$  3.0% silver. One-quarter of it was sacrificed to destructive chemical analysis and tested at 10.91% silver.

**Michele Steno (1400–1414)**

*Obv.* •+• MICHAEL •STEN<sup>o</sup> DVX Cross pattée.

Legend var.: •+• | •+ | +• | •+• | + | L.S | LS |  
 N | H | N<sup>o</sup>D | N<sup>o</sup>.D

*Rev.* •+• VEXILIFER •VENETIA 21 Winged lion with book, facing.

Legend var.: •+• | •+ | •+. | +. | + | R.V | RV  
 | N | H

**698 coins**, mean .55 g,  $\sigma$  .10 g.

Papadopoli, p. 240, 7; *CNI* 7, pp. 117–18, 38–43.

18. ✓ .54 g, 11.4%  $\pm$  2.2% silver.  
 19. → .56 g, 8.8%  $\pm$  2.0% silver.

**Tomaso Mocenigo (1414–23)**

*Obv.* •+• TOM •MODENIGO •DVX Cross pattée.

Legend var.: •+• | •+. | •+ | +

*Rev.* •+• VEXILIFER •VENETIA 21 Winged lion with book, facing.

Legend var.: •+• | •+. | •+ | +

**283 coins**, mean .52 g,  $\sigma$  .11 g (17 rev. die pairs found, some may have been missed because of poor striking).

Papadopoli, p. 253, 9; *CNI* 7, p. 123, 32–36.

20. ✓ .57 g, 13.0%  $\pm$  2.6% silver.  
 21. ← .48 g, 13.2%  $\pm$  2.6% silver.

**Francesco Foscari (1423–57)**

*Obv.* + FRAC •FOSCARIDVX Cross pattée.

Legend var.: CA | CIA

*Rev.* **+ VEXILIFER VENETIA 2** Winged lion with book, facing.

**3 coins**, mean .55 g.

Papadopoli, p. 273, 20; *CNI* 7, p. 136, 104-6.

22. ↗ .55 g, 14.9%  $\pm$  3.0% silver.

23. ↘ .56 g, 12.4%  $\pm$  2.5% silver.

### Cristoforo Moro (1462-71)

*Obv.* **•+• CRISTOF. MAVRO • DVX** Cross pattée.

Legend var.: **•+• | •+• | F.M | F<sup>o</sup>M**

*Rev.* **•+• S. MARCVS • VENETI** Winged lion with book, facing.

Legend var.: **ARC | AC**

**17 coins**, mean .57 g (3 coins from same obv. and rev. dies, 1 die pair and 1 additional obv. die link).

Papadopoli, p. 291, 10 ; *CNI* 7, p. 144, 28-30.

24. ↓ .56 g, 10.9%  $\pm$  2.2% silver.

25. ↗ .57 g, 11.8%  $\pm$  2.4% silver.

### IMITATION TORNESELLI

In the name of Antonio Venier

**110 coins**, mean .58 g.

26. ← .61 g, 4.3%  $\pm$  1.8% silver.

27. ↘ .85 g, 4.6%  $\pm$  1.8% silver.

28. ↗ .48 g, 2.4%  $\pm$  1.2% silver.

In the name of Michele Steno

**13 coins**, mean .57 g.

In the name of Tomaso Mocenigo

**4 coins**, mean .52 g.

### UNIDENTIFIED TORNESELLI

**45 coins**, mean .57 g.

## SOLDINO NUOVO

## Andrea Dandolo (1343-54)

*Obv.* •✠• ANDR • DAN DVLO • DVX • Kneeling doge.

*Rev.* •✠• S • MARVS • VENETI Lion with standard, S.

29. ↑ .57 g (clipped and broken). Papadopoli, p. 182, 5; *CNI* 7, p. 72, 224.

## MULE OF TORNESELLO AND SOLDINO

## Antonio Venier (1382-1400)

*Obv.* ✠ • ANTO • — — — RIO • DVX Cross pattée.

*Rev.* •✠• S • MARVS • VENETI Winged lion with book, facing.

30. ↓ .63 g, 10.9% ± 2.2% silver.

## Michele Steno (1400-1414)

*Obv.* ✠ • MICHAEL • STEN — — — Cross pattée.

*Rev.* •✠• S • MAR — — — VENETI Winged lion with book, facing.

31. ← .62 g, 10.8% ± 2.0% silver.

## QUATTRINO FOR CATTARO (1451)

*Obv.* STANTVS TRIOR Saint standing with palm; in field, T B.

*Rev.* ✠ S • MARVS • VENETVS Winged lion with book, facing.

32. → .97 g. Carl von Wachter, "Versuch einer systematischen Beschreibung der Venezianer Münzen nach ihren Typen," *NZ* 11 (1879), p. 127, 247.

## ANCONA

*Obv.* ⚔• DEANONÆ Cross pattée.

*Rev.* ⚔• PP•S• QVIRIÆ VQS around pearl.

33. → .49 g. Denaro. *CNI* 13, p. 9, 76. Because the V of the reverse is joined to the pearl and curved out, this appears to be later than the coins of the hoard described by D. M. Metcalf, "Classification of the Denari Primitivi of Ancona in the Light of a Recent Hoard," *NCirc* 1974, pp. 378–80. It is probably of the fourteenth century.

## BOLOGNA

*Obv.* ✠ + • DE • BO • HO • HI — — Crossed keys.

*Rev.* • S • PETR OHIVS Standing saint.

34. ↘ .75 g (chipped). Anonymous quattrino. *CNI* 10, p. 26, 39, where it is assigned to the late fourteenth or early fifteenth century.

## CAMPOBASSO

*Obv.* ⚔• CAMPIBASSI Cross pattée.

*Rev.* ❁ IIICOLL ❁ COIII ❁ Castle of Tours.

35. ↘ .87 g. Denier tournois. *CNI* 18, p. 236, 30, where such coins are attributed to Nicholas I (1422–50). These coins, common at Greek sites, are sometimes muled with dies bearing Greek mint and minters' names. They have also been assigned to Nicholas II of Campobasso (1450–62) and to unknown Greek minters: see Schlumberger, p. 357, n. 4; Tzamalīs, pp. 129–30; Giuseppi Ruotolo, "Osservazioni per l'attribuzione dei denari-tornesi di Campobasso al Conte Nicola II di Monforte-Gambatesa," *Bollettino del Circolo Numismatico Napoletano* 62–63 (1977–78), pp. 31–62.

## NAPLES

## Ladislaus (1386–1414)

*Obv.* + LADISLAVS DEI GR 4 fleurs de lis.

*Rev.* + HVGERIA IARL & SICI Cross pattée.

36. → .61 g. Denaro. *CNI* 19, p. 48, 11.

## SICILY

**Conrad I** (1250–54)

*Obv.* •✠•CONRADVS Cross pattée.

*Rev.* ✠ IERL<sup>o</sup> ET SICIL R XE

37. ↗ .72 g. Denaro. Rodolfo Spahr, *Le Monete Siciliane* 1 (Zurich and Graz, 1976), p. 206, 156.

## SPAIN: CATALONIA

**James II** (1291–1327)

*Obv.* — IHCIOBVS : REX Bust left.

*Rev.* B<sup>o</sup> R QI RO — R Cross pattée; 3 dots in quadrants 1 and 4; annulet in 2 and 3.

38. → .75 g (chipped). Diner. Joaquim Botet y Sisó, *Les Monedes Catalanes* 2 (Barcelona, 1909), p. 98.

## BYZANTIUM

**Manuel II** (1391–1423)

*Obv.* M H

N Λ Emperor standing, wearing helmet-like crown with pendilia and robe; in r., cross-ended scepter.

*Rev.* IC XC Christ, nimbate, raising r. in benediction.

39. ↘ .50 g, copper. Follaro. This coin is apparently unpublished. The types correspond to S. Bendall and P. J. Donald, *The Later Palaeologan Coinage 1282–1453* (London, 1979), p. 166, 12, and *BMCByz*, p. 638, 15, but the style of this coin is better. By letter, S. Bendall has noted that it corresponds in style to a silver coin in his collection from the same reign.

## CYPRUS

**Hugh IV** (1324–59)

*Obv.* ✠ — — — — RCI : DE Cross pattée, dots in quadrants.

*Rev.* ✠ IR — — — — — PR Lion standing l.

40. ↘ .39 g. Denier. Schlumberger, pl. 6, 23.

## RHODES

### Fourteenth Century

*Obv.* ✠ CIVI — — — — — Castle.

*Rev.* ✠ — — — — — OSPIT R — — Cross pattée; annulet  
in quadrants 1 and 4.

41. ↑ .56 g. Denier. Schlumberger, pl. 10, 2.

## GREECE: ACHAIA

### William I (1245–78)

*Obv.* ✠ GPRINCEPS Cross pattée.

*Rev.* • CL ARENTIA Castle of Tours.

42. ↑ .63 g. Denier Tournois. Schlumberger, pl. 12, 11; Tzamalīs 59.

### Florent of Hainault (1289–97)

*Obv.* ✠ FLORANS : PARI : Cross pattée.

*Rev.* DOLLARANDIA Castle of Tours.

43. → .70 g, 1.8% ± 1.0% silver. Denier tournois. Schlumberger, pl. 12, 18; Tzamalīs 64.

### Philip of Savoy (1301–7)

*Obv.* ✠ PH'S D SAB — — — h' Cross pattée.

*Rev.* DOLLARANDIA Castle of Tours.

44. ↘ .56 g. Denier tournois. Schlumberger, pl. 12, 20; Tzamalīs 66.

## ATHENS

### Guy II (1287–1308)

*Obv.* + GVI DVX ATENAS Cross pattée.

*Rev.* THABTHICIVIS Castle of Tours.

45. ↘ .68 g. Denier tournois. Schlumberger, pl. 13, 9; Tzamalīs 87.



**Guy II, Imitations***Type A*

*Obv.* ✠ GVI : DVX ATGNΘ Cross pattée.

*Rev.* THΘI : ALI : QIVI: Castle of Tours.

4 coins, mean .60 g.

46. ↓ .70 g, 1.3% ± .08% silver.  
Seltman, pl. 22, 13.

*Type B*

*Obv.* ✠ GVI DVX ATGNΘ Cross pattée.

*Rev.* THΘBANIQIVI Castle of Tours.

47. ← .78 g. Seltman, pl. 22, 12.

*Illegible*

*Obv.* Cross pattée.

*Rev.* Castle of Tours.

48. .80 g. Seltman, pl. 22, 18.

**2. FIND SPOTS OF VENETIAN TORNESELLI**

Finds from identifiable sites are indicated on the map Figure 2, p. 28; numbers here refer to those on that map.

**1. Armenoi-Apokoronou**

*Coin Hoards* 5 (1979), p. 127, 343 (Contarini-4, Venier-6, uncertain-5).

**2. Athens****a. Agora**

M. Thompson, *The Athenian Agora, 2: Coins from the Roman through the Venetian Period* (Princeton, 1954), pp. 80-82 (Dandolo-1, Dolfen-2, Celsi-9, Corner-20, Contarini-115,

Morosini-13, Venier-185, Steno-33, Mocenigo-9, Barbarigo-22, imitation-17, uncertain-208).

- b. E-W street stoa south of the Stoa of Attalos  
Communication from C. Edwards, possibly a hoard (Contarini-4, Venier-28, Steno-1, uncertain-12).
- c. Acropolis, north slope  
Communication from A. Walker (Gradenigo-1, Dolfin-1, Celsi-3, Corner-11, Contarini-29, Venier-50, Steno-14, Mocenigo-4, Moro-1, imitation-34, uncertain-47).

### 3. Chalkis

See Appendix 1, above.

### 4. Corinth

#### a. Corinth

K. M. Edwards, *Corinth*, 6, *Coins 1896-1929* (Cambridge, Mass., 1933), pp. 159-60 (Celsi-1, Contarini-6, Morosini-1, Venier-27, Steno-7, Mocenigo-1, Foscari-1, Barbarigo-2).

K. M. Edwards, "Report on the Coins Found in the Excavations at Corinth during the Years 1930-35," *Hesperia* 6 (1937), pp. 241-56 (Dandolo-1, Contarini-7, Morosini-1, Venier-11, Mocenigo-4, Barbarigo-20, Loredan-2, uncertain-11).

J. M. Harris, "Coins found at Corinth [1936-39]," *Hesperia*, 10 (1941), pp. 136-62. (Corner-1, Contarini-3, Venier-4, Steno-3, Mocenigo-1, Barbarigo-198 torneselli plus 947 imitations [as a hoard], Loredan-2, uncertain-12).

Communication from O. Zervos, unpublished finds, 1948-67 (Contarini-1, Venier-3, Barbarigo-9, imitations-2, uncertain-13).

#### b. Acrocorinth

A. R. Bellinger, "The Coins," in C. W. Blegen et al., *Corinth*, vol. 3, pt. 1: *Acrocorinth, Excavations in 1926* (Cambridge, Mass., 1930), pp. 61-68 (Contarini-2, Venier-11, Steno-4, Mocenigo-1).

### 5. Delos

J. N. Svoronos, "Ekthesis peri tou Ethnikou Nomismatikon Mouseiou," *JIAN* 1911, p. 87 (Contarini-1).

## 6. Delphi

E. Caron, "Trouvailles de monnaies du Moyen Âge à Delphes," *BCH* 1897, pp. 26–39; and J. N. Svoronos, *Ethnikon Nomismatikon Mouseion. Ekthesis ton kata to akademiaikon etos 1894–1895 pepragmenon* (Athens, 1897), pp. 57–61.

Sector A — hoard (Dandolo–3, Gradenigo–1, Dolfin–4, Celsi–12, Corner–59, Contarini–383, Morosini–7, Venier–1,254, Steno–216, uncertain–85).

Sector B — stray finds (Contarini–4, Venier–13, Steno–2).

## 7. Eretria

I. Varoucha-Christodouloupoulou, "Acquisition du Musée Numismatique d'Athènes," *BCH* 1962, pp. 417–29 (Venier–2).

## 8. Gastouni

A. P. Tzamalīs, "An Unusually Large Hoard of Tornoselli del Levante," *NCirc* 1979, pp. 183–84 (Dolfin–1, Celsi–4, Corner–11, Contarini–79, Morosini–4, Venier–276, uncertain–1).

## 9. Hagios Nikolaos

Communication from C. Davaras (Barbarigo–1).

## 10. Herakleion

G. C. Miles, "Coins from the Excavations at Ag. Petros, Herakleion, Crete," *ANSMN* 17 (1971), pp. 163–72 (Venier–2, Barbarigo–1).

## 11. Isthmia

Communication from P. A. Clement; excavations of Hexamilion at Sanctuary of Poseidon, 1967–78 (Contarini–6, Venier–34, Steno–8, Mocenigo–5, uncertain–9).

## 12. Kallipolis

D. Kravartoyannos, "Katalogos nomismatikon eurematon Kallipoleos, anaskaphes 1978," *Tetramina* 19–20 (1981), p. 1334, and communication from Mr. Kravartoyannos (Dandolo–3, Venier–1)

**13. Karthaia**

P. Graindor, "Fouilles de Karthaia," *BCH* 1905, p. 353 (Venier-3, Steno-1).

**14. Kenchreai**

R. L. Hohlfelder, *Kenchreai, Eastern Port of Corinth*, 3, *The Coins* (Leiden, 1978), pp. 79-80 (Corner-1, Contarini-2, Morosini-1, Venier-2, uncertain-3).

**15. Kleitor**

I. Varoucha-Christodouloupoulou, "Nomismata. Nomismatike Sylloge Athenon," *ADelt* 19 (1964), *Chronika*, p. 14 (uncertain).

**16. Krestaina**

M. Caramessini-Oeconomides, "Nomismata toy Moyseious Olympias," *ADelt* 18 (1963), *Chronika*, pp. 104-6 (Mocenigo-1).

**17. Lato**

J. Demargne, "Fouilles à Lato en Crète, 1899-1900," *BCH* 1903, p. 232 (uncertain-1).

**18. Lefkadia**

K. M. Konstandopoulos, "Chronique des fouilles," *BCH* 1934, p. 236, 20 (uncertain-30).

**19. Loutsikia**

Svoronos, *Ekthesis 1894-1895* (see site 6, above), p. 41 (Contarini-1).

**20. Mistra**

K. M. Konstandopoulos, "Chronique des fouilles," *BCH* 1935, p. 244, 18 (Contarini and Venier-320 in all).

**21. Meteon in Phokis**

Communication from T. Hackens (Dolfin-1, Corner-4, Contarini-2).

**22. Olynthos**

D. M. Robinson, *Excavations at Olynthus*, 3, *The Coins Found at Olynthus in 1928* (Baltimore, 1931), no. 964 (Contarini-1).

**23. Orchomenos**

A. Plassart, "Orchomène d'Arcadie; Fouilles de 1913," *BCH* 1915, p. 122 (Venier-2).

**24. Patras**

I. Varoucha-Christodouloupoulou, "Chronique des fouilles," *BCH* 1956, pp. 228-29, and communication from I. Papapostolos (uncertain).

**25. Soudeli**

M. Caramessini-Oeconomides, "Nomismatichè Sylloge Athenon," *ADelt* 22 (1967), *Chronika*, pp. 8-13, and *ADelt* 23 (1968), *Chronika*, p. 13 (Corner-6, Contarini-13, Venier-12, Steno-1, uncertain-19).

**26. Sparta**

A. M. Woodward, "The Iron Spits and Other Coins," in R. M. Dawkins, *The Sanctuary of Artemis Orthia at Sparta*, Society for the Promotion of Hellenic Studies, Supplementary Paper 5 (London, 1929), pp. 391-98 (Celsi-2, Venier-4, Steno-2, Mocenigo-1).

**27. Thasos**

I. Varoucha-Christodouloupoulou, "Chronique des fouilles," *BCH* 1950, p. 292 (Celsi, Mocenigo — unspecified).

**28. Troizen**

P. E. Legrand, "Antiquités de Trézène," *BCH* 1905, p. 271 (Contarini, Venier — unspecified).

**29. Zakynthos**

A. P. Tzamalís (See site 8, above), pp. 183-84 (Gradenigo-2, Celsi-7, Corner-20, Contarini-142, Morosini-5, Venier-469, Steno-51, imitation-2, uncertain-3).

*Unknown Find Spots***30. ANS 1982**

On deposit at the American Numismatic Society, April 1982 (Corner-7, Contarini-125, Venier-629, Steno-132, Mocenigo-30, imitation-7).

**31. ANS 1983**

On deposit at the American Numismatic Society, February 1983 (Dandolo-7, Gradenigo-8, Dolfin-13, Celsi-50, Corner-57, Contarini-198, Morosini-13, Venier-803, Steno-429, Mocenigo-29, imitation-9, uncertain-155).

**32. Greenall**

Offered to Philip D. Greenall, January 1983 (Dandolo-1, Gradenigo-1, Dolfin-2, Celsi-13, Corner-24, Contarini-51, Morosini-6, Venier-114, Steno-106). Of these, Mr. Greenall returned to the trade 21 Contarini, 72 Venier and 61 Steno.

**33. Morea**

C. Cumano, "Numismatica," *L'Istria*, 16 Mar. 1850, pp. 79-80 (Dandolo-1, Gradenigo-2, Dolfin-1, Celsi-6, Corner-10, Contarini-c. 100, Morosini-2, Venier-c. 400, Steno-8, Mocenigo-2).

**34. Seltman 1963**

A. J. Seltman, "A Hoard of Venetian Coins," *NCirc* 1963, p. 27 (Dolfin-1, Celsi-4, Corner-13, Contarini-59, Venier-154, uncertain-1).

**35. Seltman 1964**

A. J. Seltman, "A Hoard of Venetian Tornoselli," *NC* 1964, pp. 283-85 (Dandolo-2, Dolfin-2, Celsi-5, Corner-5, Contarini-10, Morosini-3, Venier-10, Steno-5, imitation-1).

### 3. EXCHANGE RATES OF THE TORNESELLO TO THE DUCAT

The following table provides the sources Figure 10 (p. 63), "Soldi per Ducat in Venice and Greece." All dates are in modern reckoning.

<i>Date</i>	<i>Rate</i> (soldi to the ducat)	<i>Place</i>	<i>Source</i>
Sept. 1352	64	Crete; Modon	Biblioteca de Catalunya, MS 252; publ. in A. Rubio i Llach, <i>Diplomatari de l'orient català</i> (Barcelona, 1947), pp. 270 and 278. This quotation is from the year before the introduction of the tornesello and sets a base rate.
3 Oct. 1359	66	Negroponte	ASV, Commemoriali 6, f. 103; publ. in Predelli and Bosmin (above, n. 109), 3, p. 433.
Jan. 1361	73-74	Vostitsa	Paris, BN, MS fr. 6537, f. 61-76; publ. in Longnon and Topping (above, n. 9), pp. 141-55, 8.
21 May 1375	73	Crete	ASV, Notaio di Candia, Antonio di Brixiano B. 11, f. 479v, 10.
Nov. 1379	75	Achaia	Florence, Bibliotheca Laurenziana, f. Ashburnham 1830, f. 4, 4a; publ. in Longnon and Topping (above, n. 9), pp. 199-207, 11.

22 Oct. 1382	75	Zante	Archivio di Stato, Genoa, Galearum marinariorum introitus et exitus, 1382, Finanza dell' antico comune, no. 724. I wish to thank John Day for supplying this figure, which he incorporated in Table 2 of his "Prix agricoles en Méditerranée à la fin du xiv <sup>e</sup> siècle (1382)," <i>Annales</i> , ESC 16 (1961), pp. 629-56.
15 Oct. 1390	83	Crete	ADC, Atti Antichi, B. 11, q. 11, f. 51v.
26 Aug. 1394	86	Crete	ADC, Memoriali, B. 30, q. 23, f. 69-71; summ. in E. Santschi, <i>Régestes des Arrêts Civils et des Mémoires (1363-1399) des Archives du Duc de Crète</i> , Bibliothèque de l'Institut Hellenique d'Études Byzantines et Post-Byzantines de Venise 9 (Venice, 1976), pp. 348-49, 1610.
20 Apr. 1402	100	Corfu	ASV, Senato, Misti 46, f. 16; publ. in Sathas (above, n. 56), 2, p. 80, 299.
7 Sept. 1403	102	Crete	ADC, Memoriali, B. 30 bis, q. 26, fasc. 6, f. 1; reports confusion as to the value of the soldo throughout the Levant, with values ranging from 104 to 108 soldi per ducat; the actual conversion for Crete is given as 102.
2 Oct. 1403	100	Coron; Modon	ADC, Ducali, B. 1, q. 3, f. 13v; publ. in Thiriet, <i>Duca di Candia</i> (above, n. 52), p. 90, 93.



31 May 1408	111	Corfu	ASV, Senato, Misti 48, f. 10; publ. in Sathas (above, n. 56), 2, p. 206, 438.
23 Jan. 1410	100	Crete	ADC, Ducali, B. 1, q. 6, f. 28-29v.
15 July 1410	107	Crete	ADC, Ducali, B. 1, q. 6, f. 36r and v.
24 July 1410	120	Negroponte	ASV, Senato, Misti 48, f. 165; publ. in Sathas, (above, n. 56), 2, pp. 245-46, 505.
27 Aug. 1410	109	Crete	ADC, Ducali, B. 1, q. 6, f. 46v.
5 Sept. 1410	105	Crete	ADC, Ducali, B. 1, q. 6, f. 17v.
14 Jan. 1411	120	Corfu	ADC, Ducali, B. 1, q. 6, f. 11.
22 Aug. 1411	116	Crete	ASV, Senato, Misti 49, f. 49v; publ. in Noiret (above, n. 59), p. 211.
21 Apr. 1417	116	Crete	ADC, Missive, B. 8, q. 1, f. 5; summ. in Thiriet, <i>Assemblées</i> (above, n. 8), 2, p. 139, 1220.
20 June 1420	140	Negroponte	ASV, Senato, Misti 53, f. 57 r and v; publ. in Sathas (above, n. 56), 3, pp. 210-11, 768.
26 July 1420	128	Crete	ASV, Senato, Misti 53, f. 63v; publ. in Noiret (above, n. 59), pp. 272-74.
4 Dec. 1424	130	Crete; Modon	ADC, Ducali, B. 1, q. 12, f. 28
7 Feb. 1425	140	Crete	ADC, Ducali, B. 1, q. 11, f. 34-35; summ. in Thiriet, <i>Assemblées</i> (above, n. 8), 2, p. 152, 1281, with rate given as 4 hyperpera, 4 soldi rather than 4 hyperpera, 12 soldi as per MS.
10 Mar. 1429	140	Negroponte	ASV, Senato, Misti 57, f. 84; publ. in Sathas (above, n. 56), 3, p. 348, 933.

c. 1434	154	Venice	ASV, Guidici di Petizion, Sentenze a Giustizia, Reg. 77, f. 80v-82v (24 May 1438). Account book of Badoer (above, n. 115), p. 239. ADC, Ducali, B. 2, q. 18, f. 7. ADC, Ducali, B. 2, q. 18, f. 7-8v. ADC, Ducali, B. 2, q. 18, f. 23v (marked f. 22); publ. in Thiriet, <i>Assemblées</i> (above, n. 8), 2, pp. 320-21, 1382.
13 May 1438	152-153	Modon	ASV, Guidici di Petizion, Sentenze a Giustizia, Reg. 90, f. 60v.
4 Oct. 1441	154	Crete	ADC, Missive, B. 8, q. 2, f. 4; summ. in Thiriet, <i>Assemblées</i> (above, n. 8), 2, pp. 184-85, 1431.
17 Oct. 1441	160	Negroponte	ADC, Missive, B. 8, q. 2, f. 28v; publ. in Thiriet, <i>Assemblées</i> (above, n. 8), 2, p. 325, 1451.
11 Feb. 1442	154	Crete	ASV, Senato, Mar 5, f. 185; publ. in Thiriet, <i>Sénat</i> (above, n. 55), 3, 216, n. 1, 3032.
17 Dec. 1442	152	Crete	Chiarini (above, n. 104), p. 145.
11 Mar. 1450	174	Crete	ADC, Ducali, B. 2, q. 25, f. 7.
22 Sept. 1450	152	Crete	ADC, Ducali, B. 2, q. 26, f. 27r and v.
15 Feb. 1457	175 1/2	Nauplia	
1458	152	Crete	
26 Sept. 1464	156	Crete	
2 Mar. 1466	198	Corfu	

The values in Figure 10 (p. 63) for the ducat in terms of soldi di piccoli of Venice were supplied by Reinhold Mueller from data compiled for appendix D of R. C. Mueller and F. C. Lane, *Money and Banking in Medieval and Renaissance Venice* (Baltimore, forthcoming).

## 4. DOCUMENTS

1. ASV, Quarantia Criminale 16, f. 55v (29 July 1353). Publ. R. Cessi, ed., *Problemi monetari veneziani (fino a tutto il secolo XIV)*, R. Accademia dei Lincei, Documenti finanziari della Repubblica di Venezia, ser. 4, 1 (Padua, 1937), pp. 104–5, 119, cited hereafter as Cessi, *Problemi*; A. Lombardo, ed., *Le deliberazioni del Consiglio dei XL della Repubblica di Venezia*, 3 vols., R. Deputazione di Storia Patria per le Venezie, Monumenti storici, NS 9, 12, 20 (Venice, 1957–67), 3, p. 28, 93, cited hereafter as Lombardo, *Deliberazioni*; and F. Thiriet, ed., *Délibérations des assemblées vénitiennes concernant la Romanie*, École Pratique des Hautes Études, VI<sup>e</sup> Section, Documents et recherches 8, 11 (Paris, 1966), 1, p. 314, 607.

Quod pro bono et utilitate communis et locorum nostrorum Choron et Mothoni, Nigropontis et Crete, ordinetur quod cudantur hic turonenses, ponendo VIII uncias raminis et unam argenti, et vadant manus LXXX turon. pro marcha. Et ex nunc sit captum quod de istis monetis mitantur in quam maiori quantitate poterit ad loca nostra predicta, mandando rectoribus quod eam expendant et expendi faciant in expensis opportunis de inde, et dent operam ad faciendum currere dictas monetas. Que moneta expendatur pro denariis III quilibet turonensis, et fiat super illa forma et cunio que videatur dominio.

2. ADC, Proclami, B. 14bis, f. 92, 164 (20 Apr. 1362).

Cum per ducale dominium missa fuerit Candidam modo nuper bona quantitas tornensium factorum in Veneciis ut decetero currere debeant et expendi per totam insulam Crete, dominatio facit notum omnibus et mandat quod dicti tornenses a modo in ante currere debeant et expendi ad rationem denariorum parvorum III pro quolibet tornense et in solutionibus fiendis de cetero recipi debeant pro precio suprascripto et nullus audeat refutare ipsos tornenses in quibuscumque solutionibus sub pena duplice.

3. ASV, Quarantia Criminale 16, f. 74 (6 Nov. 1366). Publ. in Lombardo, *Deliberazioni*, 3, p. 103, 156

Quod pro bono nostri communis ordinetur ut torneselli fiant in quam maiori quantitate fieri poterit de quibus commune sequitur tantam utilitatem, quod sicut due fornaces attendunt ad faciendum tornesellos ita deputentur tres, videlicet una alia ultra II deputatas et deputentur mendatores, stampatores et ovrerii et alia necessaria per rationem occasione istius alterius fornacis ut est iustum, intelligendo per omnia quod servantur pro duabus fornacibus secundum ordines alias captas servetur per rationem et pro rata pro ista alia fornace.

4. ASV, Quarantia Criminale 16, f. 77v (30 Dec. 1366). Publ. in Cessi, *Problemi*, p. 131, 146; Lombardo, *Deliberazioni*, 3, p. 115, 201.

Quod infrascripta pars de tornesellis committatur sapientibus electis pro factis argenti, qui examinent de omnibus et singulis utilibus pro habendo copiam magistrantie et pro faciendo fieri copiam tornesellorum possendo ponere partem, sicut possunt de aliis factis sibi commissis. Et prorogetur terminus sapientibus per totum mensem Januarii proximi.

Cum pro evidenti bono et utili nostri communis sit facere tornesellos quam plures possunt, vadit pars quod, sicut ad presens sunt tres fornaces pro tornesellis, sic de cetero sint quatuor, cum condicionibus et modis omnibus tam de magistrantia quam aliis omnibus quibus sunt dicte III. Et capta ista parte postea providebitur de augendo magistrantiam et aliis opportunis pro adimplendo istam intencionem.

5. ADC, Proclami, B. 14bis, f. 142, 62 (30 Dec. 1367).

Quod cum alias factum fuerit bannum quod torneselli missi per ducale dominium debeant currere et expendi per totam insulam Crete ad rationem tornesorum quatuor pro soldino et nunc ad aures dominationis perveniat quod persone vendentes frumentum in platea recusant recipere dictos tornesellos in solutionibus dicti frumenti, dominus ducha et eius consilium faciunt notum omnibus et mandant quod omnes persone cuiuscumque conditionis existant debeant recipere tornesellos qui eis dabuntur in omnibus et singulis solutionibus que debebunt eis fieri, quacumque ratione vel causa, et nullus audeat recusare vel refutare ipsos sub pena solvendi soldinum unum pro quolibet tornesello qui fuerit

refudatus, de qua quidem pena accusator habeat tercium si per eius accusationem habebitur veritas et teneatur de credentia, tercium sit officialibus quibus hec commissa sint et tercium deveniat in comune.

6. ASV, Senato, Misti 39, f. 34, and ASV, Zecca 5 (Capitolar dalle Broche), f. 4v (13 Jan. 138[5]). Publ. in Cessi, *Problemi*, pp. 173–74, 172; G. Bonfiglio Dosio, ed., *Il "Capitolar dalle Broche" della Zecca di Venezia (1358–1556)*, Biblioteca Winseman Falghera 1 (Padua, 1984), pp. 45–46, cited hereafter as Bonfiglio Dosio, *Capitolar*.

Quia habita consideratione ad conductionem nostram, expedit providere de augendo introitus nostri communis. Vadit pars et sic ordinetur quod quintum, quod ponitur in ceca nostra, reducatur in hac forma, videlicet, quod ubi modo dantur pro qualibet marcha soldi XIII grossorum, ita de cetero dentur soldi tresdecim et grossi sex pro marcha, cum ante guerram proxime preteritam dabantur soldi XII denarii III grossorum pro marca. Utilitas vero totius dicti quinti et additionis facte dicto quinto de qua additione commune nostrum lucratur III grossis minus pro marca quam lucraretur ante guerram, dari et assignari debeat per massarios nostros monete argenti nostris provisoribus communis. Quibus provisoribus committatur et sic teneantur observare quod statim, omni mora postposita, habita pecunia predicta, debeant emere argentum et rame et alia necessaria et faciant fieri torneselos de tota pecunia sequuta ex utilitate dicti quinti et additione facte dicto quinto. Factis quoque et habitis per prefatos provisos dictis torneselis, debeant subito, sicut habebunt ipsos, ordinate dare et consignare dictos torneselos camerariis nostri communis, qui camerarii teneantur et debeant recipere et conservare predictos torneselos ac scribere per ordinem et distincte receptionem ipsorum, sicut faciunt alios introitus nostri communis. De quibus quidem torneselis dominium nostrum disponere debeat, prout pro nostro communi melius et utilius apparebit, quod redundabit in magnum lucrum nostro communi, sicut est omnibus manifestum. Intelligendo de argento quod emetur post captionem istius partis, quod sit ad conditionem presentis partis, sed argentum quod est emptum usque diem presentem sit ad primam conditionem. Et addantur hec in capitulari cuiuslibet officiorum predictorum, quod teneantur predicta inviolabiter observare.

7. ASV, Senato, Misti 39, f. 80v–81r (25 May 1385). Publ. in Cessi, *Problemi*, p. 175, 174.

Quod pro bono nostri communis ordinetur quod, sicut sunt duo massarii monete in S. Marco, ita esse debeant tres massarii, sicut erant primo, et iste massarius qui elligetur de novo fiat per modum solitum ellectionis in Maiori Consilio cum salario librarum sex grossorum in anno, sicut habet ser Rambaldus Mauroceno, et cum aliis condicionibus sicut sunt alii duo massarii monete. Verum comittatur in speciali dicto massario de novo elligendo quod teneatur et debeat facere laborari et fieri de tornesellis et parvis in quam maiori quantitate poterit pro bono communis nostri. Et debeat iste massarius habere locum separatum et sibi deputatum per se pro facto tornesellorum et parvorum ita quod rame non imisceatur cum argento. Item teneatur iste massarius esse simul cum aliis duobus massariis ad bulandum petias argenti habendo suam partem bagatini, sicut primo habebat, quando erant tres massarii. Item ordinetur quod debeat fieri et deputari per Dominum, Consiliarios et Capita, vel per maiorem partem eorum, unus scribe sufficiens in officio predicto massariorum monete, dando sibi de salario ducatos quadraginta in anno et ratione anni.

8. ASV, Senato, Misti 40, f. 16 and ASV, Zecca 5 (Capitolar dalle Broche), f. 5v (25 Jan. 138[6]). Publ. in Cessi, *Problemi*, p. 179, 177; Bonfiglio Dosio, *Capitolar*, pp. 48–49.

Quia in ceca nostra cuduntur marche XII mille tornesellorum annuatim, pro quibus commune nostrum recipit bonam utilitatem ad summam duc. IIII mille. Vadit pars quod pro comodo et bono agradorum nostrorum, quod iste marche XII mille, sicut cudentur de tempore in tempus, ponantur apud provisores nostri communis sicut fiunt denarii de istis aliis impositoribus sive provisionibus pro istis nostris negociis. Que marche XII ascendent ad summam ducatorum XIII mille vel circa [compare with Capitolar, XIII mille].

9. ASV, Senato, Misti 57, f. 163v (28 Oct. 1429). Publ. in C. N. Sathas, ed., *Documents inédits relatifs à l'histoire de la Grèce au Moyen Âge* (Paris, 1880–90), 3, pp. 359–60, 948; hereafter cited as Sathas, *Documents*.

Cum locus noster Nepanti sit locus principalis confinium nostrorum cum Turchis ab illa parte . . . quia rectores predicti habent de salario in

anno ducatos quadringentos [400] ad rationem soldorum nonagintasex [96] pro ducato, et ducatus ibi currit ad soldos centum quadraginta [140], ex quo non percipiunt ad aurum de salario nisi ducatos ducentosseptuagintaquatuor [274] in anno vel circa . . . Vadit pars quod rector Nepanti nunc eligendus et alii qui decetero eligentur habere debeant ducatos quadringentossexaginta [460] de salario in anno et ratione anni, solvendo sibi deinde ad soldos nonagintasex [96] pro ducato sicut omnes rectores levantis . . .

10. ASV, Senato, Misti 59, f. 124 (25 July 1435). Publ. in Sathas, *Documents*, 3, p. 427, 1019.

Cum in Nigroponte ducatus ascendit ad magnum precium, et hoc propter falsam monetam tornesiorum, que a parte terre illuc conducta fuit, et quotidie conducitur in maximum damnum datiorum nostrorum, et necesse sit providere, prius quam res ad deterius reducatur; Vadit pars quod mandetur regimini Nigropontis quod habito consilio illorum fidelium nostrorum, qui sibi videbuntur super talibus falsis tornesiis, ipsi debeant facere illam provisionem que sibi videbitur esse utilem, ita quod nostrum commune pro talibus falsis tornesiis tantum damnum non recipiat.

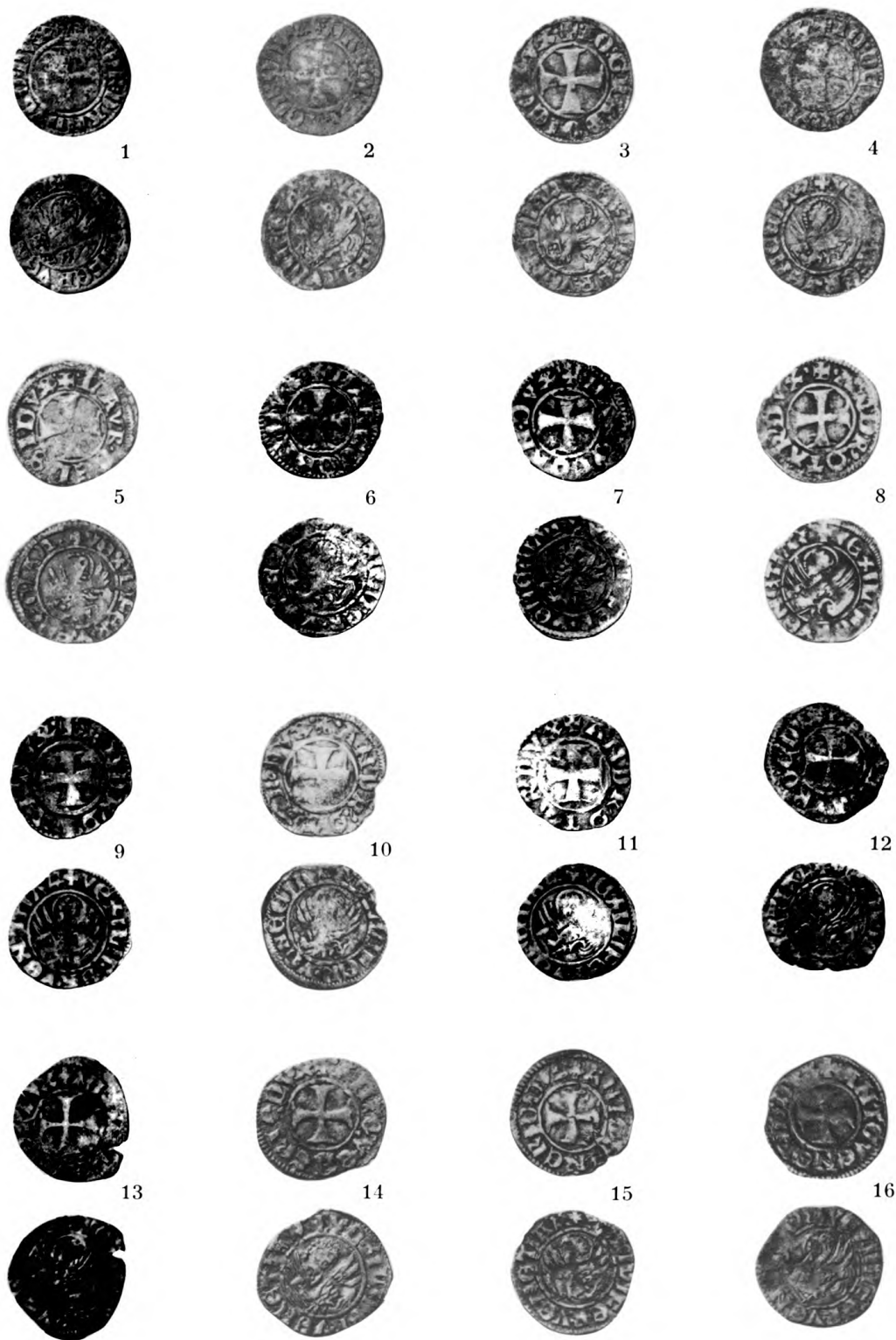
11. ASV, Senato, Mar 7, f. 77v, 14 (14–20 Aug. 1462). Publ. in H. Noiret, ed., *Documents inédits pour servir à l'histoire de la domination vénitienne en Crète de 1380 à 1485*, Bibliothèque des Écoles Françaises d'Athènes et de Rome, ser. 1, fasc. 61 (Paris, 1892), pp. 477–78.

Cum damnum maximum paciantur non solum mercantie, verum etiam magis atque magis introitus redditusque totius insule et feudatorum, et aliorum omnium et potissimum commune Candide, totiusque insule, et ita ut, nisi provideatur ne ducatus ascendat ad precium extremum, successurum sit damnum intollerabile publicum et privatum, que res magnopere est omnino advertenda. Quod inconveniens principaliter sit processum propter infinitum quemdam numerum tornesiorum in hac insula conductorum, tum ab aliis locis huius Orientis tum vel maxime a Morea et aliis locis a Theucro subiugatis. Cum igitur necessarium sit super hoc providere, quoniam nummi commutatio necessaria est ad vite humane substationem. Ideo supplicatur Ser<sup>mo</sup> nostro Dominio quod,

ultra provisiones que spectant huic M. Regimini, ut est purificatio tornesiorum, clamando per publica edicta, sub maximis penis, ne ab extra conducantur, ut alias provisum fuit; supplicatur impresentiarum pro remedio opportuno, quod placeat stabilire et limitare ducatum usque ad annos tres ad yperpera V et grossos sex. Item ut nemo audeat sub magna pena conducere tornesiorum monetam falsam.

Respondeatur: Dominium nullo pacto videre modum, nec posse eis satisfacere, velleque quod ducatus currat sicuti ferunt temporum conditiones. De tornesiis vero qui de extra insulam conducuntur, nullo modo quod de cetero conducantur, sub pena amittendorum eorum et totidem pro pena.





Chalkis Hoard - Venetian Coins

# Plate 2



17



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Chalkis Hoard - Venetian Coins



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48



Chalkis Hoard - Other Mints

Plate 4



(3.5X)



Tornese with Over-Punched Legend





(3.5X)



Tornese with Over-Punched Legend









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